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U.S. Department of the Interior
Bureau of Land Management
Arizona State Office

Tucson Field Office August 2001

Draft
Las Cienegas Resource Management Plan and Environmental Impact Statement

2002-006926/NF

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The Bureau of Land Management is responsible for the balanced management of the public lands and resources and their various values so that they are considered in a combination that will best serve the needs of the American people. Management is based upon the principles of multiple use and sustained yield; a combination of uses that take into account the long term needs of future generations for renewable and nonrenewable resources. These resources include recreation, range, timber, minerals, watershed, fish and wildlife, wilderness and natural, scenic, scientific, and cultural values.

BLM/AZ/PL-01/005

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MARCH 3, 1849

United States Department of the Interior

BUREAU OF LAND MANAGEMENT

Tucson Field Office
12661 East Broadway
Tucson, AZ 85748-7208

(520) 258-7200

In reply refer to:

1610 (AZ060)

August 10, 2001

Dear Reader:

Enclosed is the draft Las Cienegas Resource Management Plan (RMP) and Environmental Impact Statement (EIS) for your review and comment. This document describes our proposed plan and three alternative plans for management of the Las Cienegas National Conservation Area (NCA) and Sonoita Valley Acquisition Planning District. As directed in the Act of Congress establishing the Las Cienegas NCA, this RMP/EIS incorporates the latest version of the Empire-Cienega Resource Conservation Area plan which was nearing completion when the NCA was designated.

The BLM wishes to express its appreciation to all of those who contributed their time and expertise to this planning effort through participation in the Sonoita Valley Planning Partnership over the past 5 years. Public collaboration through the SVPP process led to the shaping of issues considered in this planning effort, to development of desired resource conditions for the Cienega Creek watershed which have been incorporated as the foundation of this plan and to the development of the four alternative management strategies for the public lands within the Las Cienegas NCA and Sonoita Valley Acquisition Planning District.

The release of the draft RMP/EIS begins a 90 day comment period. During this time period, we encourage you to review the document and provide us with your comments about the management proposals. To assist with the review process and provide an opportunity to discuss management proposals with BLM resource specialists and other participants in the planning process, we have scheduled three open houses. The open houses will be informal and will be held at the following locations and times:

Location	Date/Time
Santa Cruz County Fairgrounds South Highway 83, Sonoita, AZ	September 25, 2001 from 4:00-7:00 pm
Mesa Centennial Center, Rendezvous Center, Apache Room 263 North Center, Mesa, Arizona	September 26, 2001 from 3:30-7:30 pm
Pima Community College, EAST Campus, Community Room 8181 E. Irvington Road, Tucson Arizona	September 27, 2001 from 3:30-7:30 pm

Please note that comments, including names and street addresses of respondents are available for public review and may be published as part of the Final EIS or other related documents. Individual respondents may request confidentiality. If you wish to withhold your name or street address from public review or from disclosure under the Freedom of Information Act, you must state this prominently at the beginning of your written comment. Such requests will be honored to the extent allowed by law. All submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials or organizations or businesses, will be made available for public inspection in their entirety.

The comment period will end **November 23, 2001.** All comments must be postmarked by that date to ensure consideration in preparation of the final RMP/EIS. Written comments should be sent to the attention of: David McIlnay, Acting Field Manager, Tucson Field Office, 12661 E. Broadway, Tucson, Arizona 85748. Please call Karen Simms, Community Planner, if you have any questions at (520) 258-7210. We appreciate your interest and encourage your continued involvement in the planning process.

Sincerely,

David McIlnay

David McIlnay
Acting Field Manager

Enclosures:
DEIS

DRAFT
Las Cienegas Resource Management Plan
and
Environmental Impact Statement

Prepared by

U.S. Department of the Interior
Bureau of Land Management
Tucson Field Office
Arizona

AUGUST 2001

RECOMMENDED:

David McIlnay
Acting Field Manager, Tucson Field Office

APPROVED:

Denise P. Meridith
State Director, Arizona

This Draft Resource Management Plan (RMP) and Environmental Impact Statement (EIS) describes and analyzes four alternatives for managing the public lands and resources within the Las Cienegas National Conservation Area (NCA) and the Sonoita Valley Acquisition Planning District.

For further information contact Karen Simms, Ecosystem Planner, Tucson Field Office, Bureau of Land Management, 12661 E. Broadway, Tucson, Arizona 85748 or call (520)258-7200.

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SUMMARY

INTRODUCTION

The Draft Las Cienegas Resource Management Plan is a complete plan for managing the 49,000 acres of public land, resources, and uses within the Las Cienegas National Conservation Area (NCA) and Sonoita Valley Acquisition Planning District (Chapter 1, Map 1-1). This plan differs from traditional BLM plans in several ways.

- It combines both the land use plan and activity plan levels of BLM planning in one document.

- It was developed through a collaborative public planning process.

- It is designed to use principles of adaptive management.

Through this document we are making land use plan decisions, including desired resource conditions, resource allocations and special designations for the Las Cienegas National Conservation Area and public lands within the Sonoita Valley Acquisition Planning District. In the same document we are also preparing an interdisciplinary activity plan for these areas. This activity plan implements the land use plan decisions through a set of management actions traditionally found in the following documents:

- Watershed management plans.

- Wildlife habitat management plans.

- Cultural resource management plans.

- Allotment management plans.

- Recreation management plans.

The plan is also integrated with a draft environmental impact statement (DEIS) that describes the potential environmental impacts of the proposed Las Cienegas Resource Management Plan. We have prepared the Draft Resource Management Plan and DEIS according to the requirements of the Federal Land Policy and Management Act (FLPMA) and the National Environmental Policy Act (NEPA).

PURPOSE AND NEED

The Las Cienegas NCA was designated by Congress in December 2000 in order to conserve, protect, and enhance the unique and nationally important aquatic, wildlife, vegetative, archaeological, paleontological, scientific, cave, cultural, historical, recreational, educational, scenic, rangeland and riparian resources and values of the public lands within the NCA. The act establishing the Las Cienegas NCA directed BLM to prepare a comprehensive management plan for the long-term management of the public lands within the NCA within 2 years of designation.

The Las Cienegas Resource Management Plan/Environmental Impact Statement has been prepared to guide and implement management for the public lands within the Las Cienegas NCA and Sonoita Valley Acquisition Planning District to ensure that these resources and values are protected and to resolve issues associated with management of the public lands within these areas. The issues and the planning process are described in more detail later in this Chapter. Chapter 5 provides additional details on the planning process and public input. As specified in the act, the Draft Las Cienegas Resource Management Plan has been prepared from a draft of the Empire-Cienega Management Plan, which was in preparation when the NCA was designated, and in accord with the resource goals and objectives developed through the Sonoita Valley Planning Partnership process.

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THE PLANNING AREA

The Empire-Cienega Planning Area encompasses 266 mi² (170,558 acres) in southeast Arizona, roughly bounded by Interstate 10 on the north, Arizona State Highway 83 on the west, the Whetstone Mountains on the east, and the Audubon Society's Appleton-Whittell Research Ranch on the south (Chapter 1, Map 1-2). The Planning Area includes both the Las Cienegas NCA and Sonoita Valley Acquisition Planning District.

Together, the Las Cienegas NCA and Sonoita Valley Acquisition Planning District encompass much of the upper Cienega Creek watershed, which is important to Tucson for flood control and aquifer recharge. The area also has the following attributes:

- Five of the rarest habitat types in the American Southwest: cienegas, cottonwood-willow riparian areas, sacaton grasslands, mesquite bosques, and semidesert grasslands.
- Habitat for several endangered species.
- A site on the National Register of Historic Places.
- Two proposed wild and scenic river segments.
- Scenic open space.

THE PLANNING PROCESS

We prepared this plan using several of the outcomes of the Sonoita Valley Planning Partnership (SVPP). The SVPP is a voluntary association of federal, state, and local agencies, organizations, and private citizens who share a common interest in the resources and management of the public lands within the Sonoita Valley, an area that includes the entire upper watershed of Cienega Creek. Chapter 1 describes in more detail the SVPP collaborative planning process and its outcomes.

PLANNING ISSUES

Twelve major planning issues were generated for the Empire-Cienega Planning Area from initial public scoping, the collaborative planning process, and BLM interdisciplinary team members. These issues can be grouped into three categories relating to (1) desired future conditions, (2) land use allocations, and (3) special designation areas. Additional implementation issues were also generated under each of these broad categories.

DESIRED RESOURCE CONDITION ISSUES

Issue 1:	Upland Area Management
Issue 2:	Riparian Area Management
Issue 3:	Fish and Wildlife Management
Issue 4:	Management of Visual Resources
Issue 5:	Cultural Resource Management
Issue 6:	Maintenance of desired economic and quality-of-life conditions

LAND USE ALLOCATION ISSUES

Issue 7:	Development of Salable, Locatable, and Leasable Minerals
Issue 8:	Designation of Utility Corridors.
Issue 9:	Off-Highway Vehicle Designation
Issue 10:	Designation of Recreation Zones
Issue 11:	Livestock Grazing

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ISSUES RELATING TO SPECIAL DESIGNATIONS OF PUBLIC LANDS

Issue 12: Designation of Areas of Critical Environmental Concern

MANAGEMENT GUIDANCE

Regardless of the alternative chosen, BLM's management of public lands and resources is governed by many laws, regulations, and policies. Although not all of these can be summarized in this document, Table 2-1 summarizes the major laws, regulations, and policies that apply to the resources and proposals being analyzed in this plan amendment/EIS. Appendix 2 describes the major resource programs and management guidance in more detail.

DESIRED FUTURE CONDITIONS

The SVPP developed a vision, goals, and resource objectives for the Sonoita Valley area (roughly the upper Cienega Creek basin and small portions of the upper Babocomari and Sonoita Creek basins) to be incorporated into planning efforts for the valley. As a participant in the planning partnership, BLM has incorporated the vision, goals, and objectives as the foundation for the Las Cienegas Resource Management Plan. Each action alternative is designed to achieve or maintain these future conditions by meeting resource objectives.

ALTERNATIVES CONSIDERED

LAND USE PLAN ALTERNATIVES

Alternative 1-No Action (Current Management)

Alternative 1, the No Action Alternative, would continue current management. Current management has been ongoing under the interim management guidance for the Empire-Cienega Planning Area included in the Phoenix Resource Management Plan (BLM 1988) and the interim grazing plan (BLM 1995). The management goal for the area as stated in the interim management guidance is to "preserve, protect, and enhance the property's multiple use values." "These values include an extensive riparian area, presence of an endangered species, outstanding small and big game habitat, magnificent open space, and potential for dispersed recreation activities such as hiking, horseback riding, camping, and picnicking." Under current management, desired resource conditions include an emphasis on federally listed threatened and endangered fish and wildlife and significant cultural properties. Land use allocations are limited to continuing the existing livestock grazing leases and continued closure to mineral exploration and development of lands acquired before the enactment of the Federal Land Exchange Facilitation Act of 1988. Alternative 1 would not designate utility corridors, ACECs, recreation zones, or an Arizona Trail corridor. As the baseline against which other alternatives are compared, Alternative 1 is required by the National Environmental Policy Act (NEPA).

The Action Alternatives (Alternatives 2, 3, and 4)

The three action alternatives differ from current management in several ways. Under all three, desired resource conditions would include maintaining or achieving goals and objectives for the planning area developed by the Sonoita Valley Planning Partnership. Management under all three alternatives would emphasize the following:

- Conservation of four rare vegetation communities and 18 associated priority species.
- Retention of the scenic values of the landscape.
- Preservation, adaptive restoration, or scientific investigation of significant cultural properties.

The action alternatives propose differing land use allocations for mining, utility corridors, recreation zones, corridors for the Arizona Trail, and grazing. Each alternative would make special designations for areas of critical environmental concern (ACECs).

Alternative 2 (Agency Preferred)

Alternative 2 emphasizes ecosystem management and the use of partnerships and collaboration during implementation to achieve desired resource conditions. Biannually, a Biological Planning Team would collaboratively evaluate monitoring data and issues relating to livestock grazing, recreation, and wildlife management for the primary goal of maintaining or achieving desired resource conditions. BLM would designate all public lands within the planning area as an area of critical environmental concern (ACEC) to protect sensitive riparian and wetland habitats. Livestock grazing would continue on public land allotments, but grazing operations would incorporate variable stocking rates and flexible rotations. BLM would designate two utility corridors and a corridor for the Arizona Trail and would close or restrict the use of some roads to provide a mix of motorized and non-motorized recreation while ensuring that desired resource conditions are met. Both mechanized and motorized vehicles would be restricted to designated routes. *This alternative is preferred by participants in the Sonoita Valley Planning Partnership.*

Alternative 3

Alternative 3 proposes allowing the greatest mix of land uses with restrictions to protect sensitive areas. It would designate two ACECs to protect sensitive riparian and wetland habitats. Outside the ACECs, public lands would be opened to mining, oil and gas leasing, and mineral sales. Livestock grazing would continue on public land allotments, but current livestock grazing operations would be modified by reducing livestock numbers to conservative fixed stocking rates and establishing structured pasture rotations rather than variable stocking rates, seasonal use, and flexible rotations. BLM would designate three utility corridors and a corridor for the Arizona Trail. Alternative 3 proposes fewer road closures and restrictions than do Alternatives 2 and 4 with emphasis on a mix of motorized and non-motorized recreation opportunities. Alternative 3 would also limit camping to designated sites on the most acreage.

Alternative 4

Emphasizing land use closures and restrictions and limits on development as the approach to achieving desired resource conditions, Alternative 4 is the most restrictive of the alternatives. It would provide for the following:

- Public lands would remain closed to mining and would be closed to livestock grazing.
- All public lands would be designated as an area of critical environmental concern.
- A single utility corridor would be designated for major utility lines.

- The Arizona Trail corridor would use the existing road system and require shared use of motorized and non-motorized travel.

- More roads would be closed or restricted than under any other alternative.

- Both mechanized and motorized vehicles would be restricted to designated routes.

- Recreation developments would be limited to the smallest area.

- More area would be designated as recreation Zone 3–open to dispersed recreation with fewer restrictions–than under any other alternative.

ACTIVITY PLAN ALTERNATIVES

There are four alternative interdisciplinary activity plans which implement the land use plan alternatives. The Activity Plan for Alternative 1 is limited to the existing interim grazing plan and project-by-project considerations for other resource programs, including cultural resources, wildlife, and recreation. The Activity plans for Alternatives 2, 3, and 4 have in common a series of actions to meet the desired resource conditions for upland and riparian vegetation, wildlife habitats, cultural, and visual resources. The Activity plans for Alternatives 2, 3, and 4 vary mainly by the proposals for implementing livestock grazing decisions and recreation management.

ENVIRONMENTAL CONSEQUENCES

Table 2-32 in Chapter 2 of this document summarizes the potential environmental impacts of the four alternatives. Detailed descriptions of impacts of the four alternatives are provided in Chapter 4. The impacts depict the projected changes that would occur to the environment if the alternative was implemented.

Chapter 4 also provides a description of cumulative impacts, irretrievable and irreversible commitments of resources, and unavoidable adverse impacts of the alternatives. The cumulative impact analyses address the degree and extent of the cumulative impacts on the environment. Cumulative impacts include the impact on the environment of incremental changes from various actions when added to other past, present, and reasonably foreseeable changes. Cumulative impacts can also result from individually minor, but collectively significant, actions.

CONSULTATION AND COORDINATION

Chapter 5 provides information on public involvement in the planning process. Also included is a summary of BLM's coordination with state and federal agencies.

CHAPTER 1

PURPOSE AND NEED

Cienega Creek flows year round through the National Conservation Area.

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CHAPTER 1
PURPOSE AND NEED

INTRODUCTION

The Draft Las Cienegas Resource Management Plan is a complete plan for managing the 49,000 acres of public land, resources, and uses within the Las Cienegas National Conservation Area (NCA) and Sonoita Valley Acquisition Planning District (Map 1-1). Both the NCA and Planning District are within the Empire-Cienega Planning Area boundary (Map 1-2) which was delineated prior to their designation by Congress. This plan differs from traditional BLM plans in several ways.

- It combines both the land use plan and activity plan levels of BLM planning in one document.
- It was developed through a collaborative public planning process.
- It is designed to use principles of adaptive management.

Through this document we are making land use plan decisions, including desired resource conditions, resource allocations, and special designations for the Las Cienegas National Conservation Area and public lands within the Sonoita Valley Acquisition Planning District. In the same document we are also preparing an interdisciplinary activity plan for these areas. This activity plan implements the land use plan decisions through a set of management actions traditionally found in the following documents:

- Watershed management plans.
- Wildlife habitat management plans.
- Cultural resource management plans.
- Allotment management plans.
- Recreation management plans.

The plan is also integrated with a draft environmental impact statement (DEIS) that describes the potential environmental impacts of the proposed Las Cienegas Resource Management Plan. We have prepared the Draft RMP and DEIS according to the requirements of the Federal Land Policy and Management Act (FLPMA) and the National Environmental Policy Act (NEPA).

We have made every attempt to make the different planning levels in this document as seamless as possible for the reader. But because of the different policies, regulations, and procedures that apply to the two levels of planning, we have decided to differentiate the two levels in Chapter 2, the Description of the Alternatives. In Chapter 2, we have separated the descriptions of the alternatives into two parts. The first part describes the land use plan alternatives. The second part describes the interdisciplinary activity plans which implement each alternative. Within each alternative, we have arranged the proposed actions by resource topic. We have organized Chapter 4, the analysis of impacts, by affected resource and have described the impacts of each alternative on that resource. Chapter 4 combines the impacts on the affected resources from the two levels of planning.

We prepared this plan using several of the outcomes of the Sonoita Valley Planning Partnership (SVPP). The SVPP is a voluntary association of federal, state, and local agencies, organizations, and private citizens who share a common interest in the resources and management of the public lands within the Sonoita Valley, an area that includes the entire upper watershed of Cienega Creek. The Planning Process section describes in more detail the SVPP collaborative process and its outcomes.

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The Draft Las Cienegas Resource Management Plan is one of several ongoing or upcoming planning efforts within the Sonoita Valley. Since we could not attain a broad ecosystem plan that crossed jurisdictional boundaries, the SVPP's hope is that each planning effort will incorporate the desired conditions for the watershed and develop strategies to achieve them. In this way, we hope to achieve a healthy functional ecosystem.

PURPOSE AND NEED

The Las Cienegas NCA was designated by Congress in December 2000 in order to conserve, protect, and enhance the unique and nationally important aquatic, wildlife, vegetative, archaeological, paleontological, scientific, cave, cultural, historical, recreational, educational, scenic, rangeland and riparian resources and values of the public lands within the NCA (Appendix 1). The Act establishing the Las Cienegas NCA directed BLM to prepare a comprehensive management plan for the long-term management of the public lands within the NCA within two years of designation.

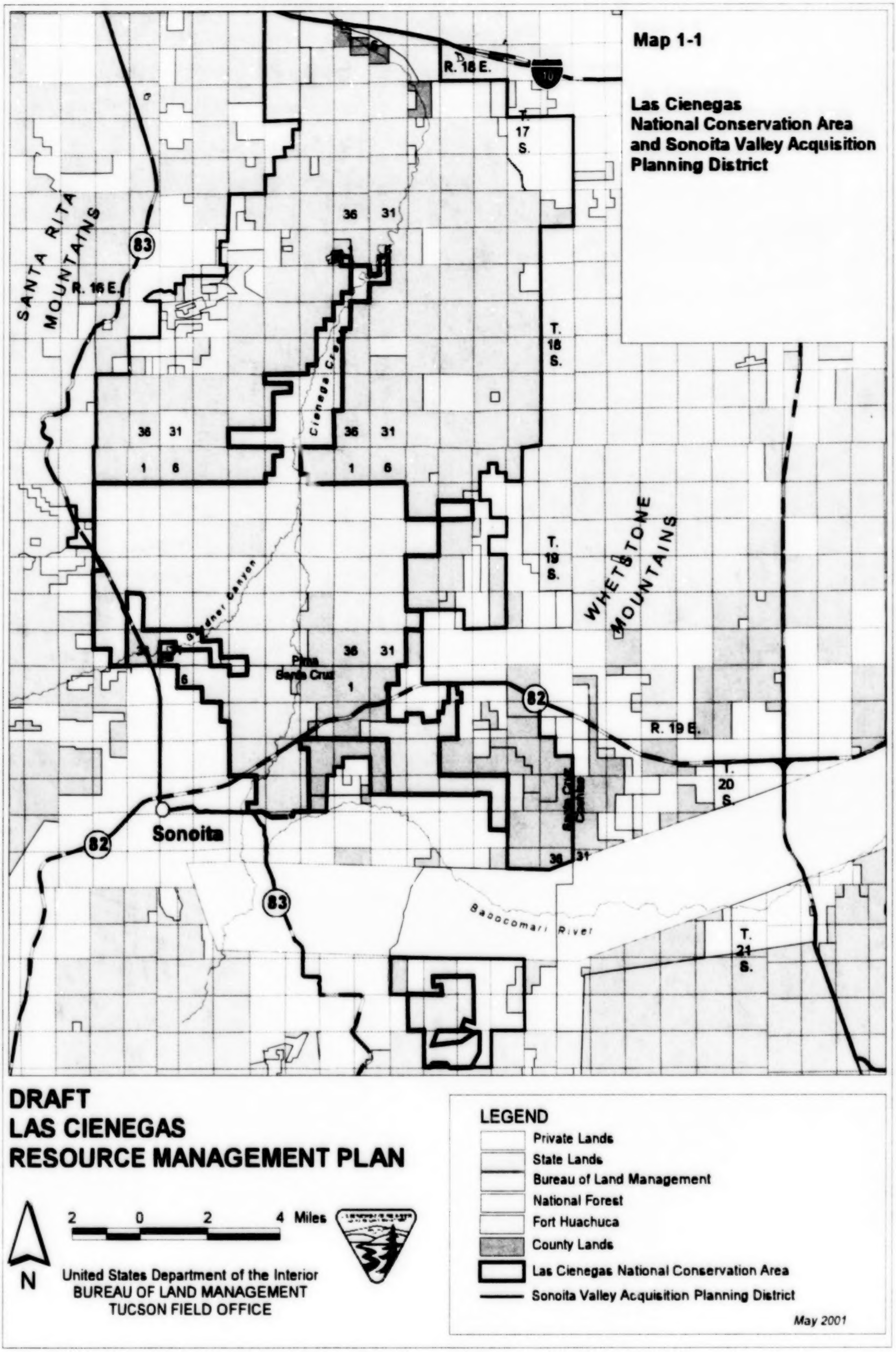
The Las Cienegas Resource Management Plan/Environmental Impact Statement has been prepared to guide and implement management for the public lands within the Las Cienegas NCA and Sonoita Valley Acquistion Planning District to ensure that these resources and values are protected and to resolve issues associated with management of the public lands within these areas. The issues and the planning process are described in more detail later in this Chapter. Chapter 5 provides additional details on the planning process and public input. As specified in the Act, the Draft Las Cienegas Resource Management Plan has been prepared from a draft of the Empire-Cienega Management Plan, which was in preparation when the NCA was designated, and in accord with the resource goals and objectives developed through the Sonoita Valley Planning Partnership process.

BACKGROUND

In 1988 BLM acquired, through a land exchange, 45,000 acres within the Empire, Cienega, and Rose-tree ranches in northeast Santa Cruz County and southeast Pima County, Arizona. Later exchanges have brought in 4,000 more acres. These lands, which became the Empire-Cienega Resource Conservation Area (RCA), have extremely high social, cultural, and resource values for the local and national public. These values include healthy watersheds, extensive native grasslands, intact riparian systems, endangered and special status species habitats, prehistoric and historic cultural resources, and varied dispersed recreation opportunities.

Over the years since acquisition of the Empire-Cienega RCA, several special designations have been made or proposed for the area because of its significant resources.

- The historic Empire ranch headquarters has been proposed for listing on the National Register of Historic Places (The Empire Ranch House is already listed).
- Two segments of Cienega Creek have been proposed to Congress for designation as scenic river segments in the Wild and Scenic Rivers System.
- The American Bird Conservancy has designated the RCA as a continentally important bird area.



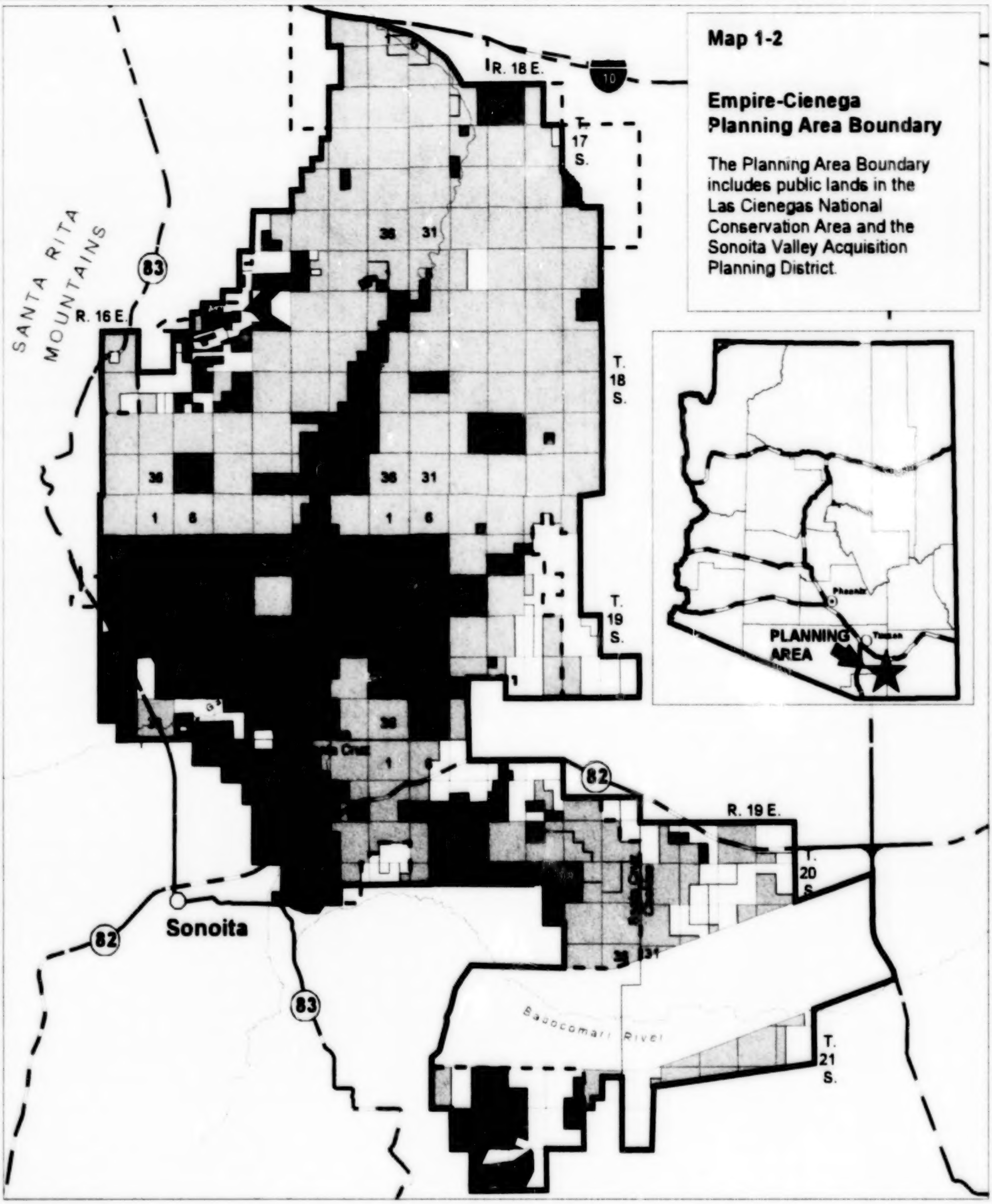
Map 1-1

Las Cienegas National Conservation Area and Sonoita Valley Acquisition Planning District

DRAFT
LAS CIENEGAS
RESOURCE MANAGEMENT PLAN

United States Department of the Interior
BUREAU OF LAND MANAGEMENT
TUCSON FIELD OFFICE

May 2001


Map 1-2
Empire-Cienega Planning Area Boundary
The Planning Area Boundary includes public lands in the Las Cienegas National Conservation Area and the Sonoita Valley Acquisition Planning District.
R. 18 E.
10
T. 17 S.
SANTA RITA MOUNTAINS
83
R. 16 E.
36
31
T. 18 S.
36
1
6
36
31
1
6
T. 19 S.
1
36
1
6
82
R. 19 E.
T. 20 S.
Sonoita
82
83
36
31
Babocomari River
T. 21 S.
Phoenix
Tucson
PLANNING AREA

DRAFT
LAS CIENEGAS
RESOURCE MANAGEMENT PLAN

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TUCSON FIELD OFFICE

LEGEND

━	Planning Area Boundary
■	BLM Land
▒	State Land
□	Private Land
░	Las Cienegas National Conservation Area
- - -	Sonoita Valley Acquisition Planning District

May 2001

- The Appleton-Whittell Area of Critical Environmental Concern (ACEC), designated in the Phoenix Resource Management Plan, has been enlarged and set aside for research.

- Most of the public lands in the RCA (nearly 42,000 acres) have just been designated as the Las Cienegas National Conservation Area. The remainder have been included within the Sonoita Valley Acquisition Planning District (Map 1-1, Appendix 1).

While acquiring the public lands within the Empire-Cienega RCA, BLM was completing the Phoenix Resource Management Plan/EIS (BLM 1988) and included in the document interim management guidelines for the area. But it was too late to incorporate and analyze land use planning alternatives for the RCA. As a result, BLM was mandated to develop a land use plan for the acquired public lands within the RCA. The number of special designations and significance of the resources also pointed to the need to develop a variety of activity-level plans.

After several false starts on developing a land use plan between 1989 and 1994, BLM decided in 1995 to take a new approach that would involve more public participation in all aspects of planning (summarized in Chapter 5). The approach would also improve communication and coordination with surrounding public and private landowners. This desire for a new collaborative approach led to the creation of the Sonoita Valley Planning Partnership, which is discussed in more detail later in this chapter.

SETTING

A unique, scenic area of open, rolling grasslands in a high desert basin, the Sonoita Valley (Map 1-3) lies in the uppermost watersheds of three streams in southeast Arizona: the Babocomari River, Cienega Creek, and Sonoita Creek. To the north spread the grasslands and woodlands of the Las Cienegas National Conservation Area managed by BLM. To the south, east, and west are the woodlands and forests managed by two units of Coronado National Forest.

At the crossroads of two scenic highways within an hour of the rapidly growing Tucson metropolitan area, the Sonoita Valley is surrounded by public lands with outstanding dispersed recreation opportunities, a variety of traditional uses, and significant natural resources, including several endangered species. The valley still retains wide open spaces, rural lifestyles and values, and a great variety of plant communities and wildlife. But at the same time the valley is also vulnerable to the impacts of rapid growth and the intensifying conflicts at the urban-rural interface.

Within the Sonoita Valley, the Las Cienegas NCA and Sonoita Valley Acquisition Planning District encompass much of the upper Cienega Creek watershed, which is important to Tucson for flood control and aquifer recharge. The area also has the following attributes:

- Five of the rarest habitat types in the American Southwest: cienegas, cottonwood-willow riparian areas, sacaton grasslands, mesquite bosques, and semidesert grasslands.

- Habitat for several endangered species.

- A site on the National Register of Historic Places.

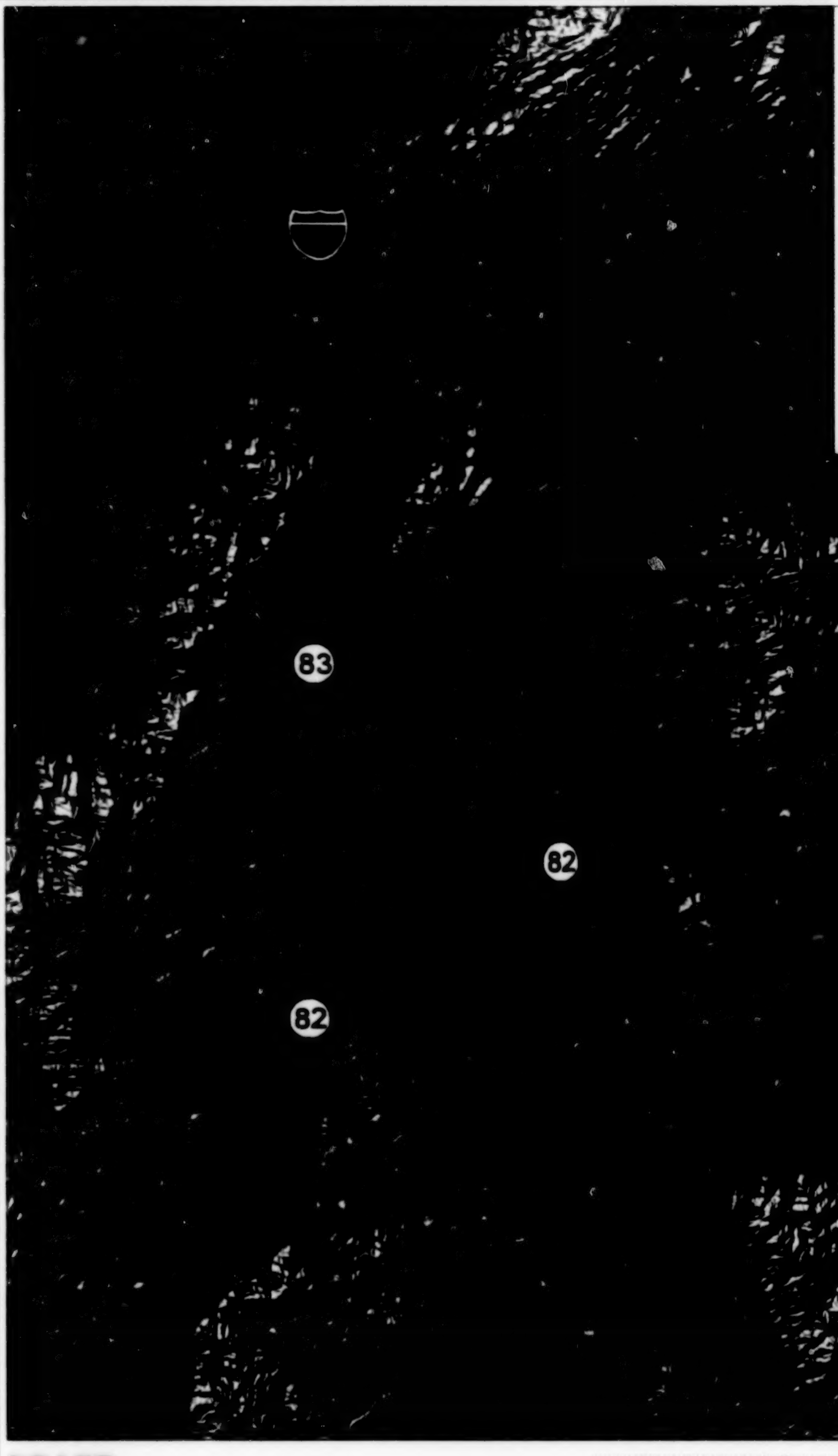
- Two proposed wild and scenic river segments.

- Scenic open space.

Map 1-3

Area of Interest Sonoita Valley Planning Partnership

The Area of Interest is generally defined by the Canelo Hills to the south, I-10 to the north, between the Whetstone and Santa Rita Mountains



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LAS CIENEGAS
RESOURCE MANAGEMENT PLAN

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TUCSON FIELD OFFICE

LEGEND

- —— Planning Area Boundary
- ■ Area of Interest
- -··-·· County Boundary

May 2001

In addition to Tucson, the area is readily accessible from the nearby towns of Sonoita, Patagonia, Benson, and Sierra Vista. Dirt roads provide access into the area by connecting with State Highways 82 and 83.

PLANNING AREA

The Empire-Cienega Planning Area boundary corresponds to the boundary of the Empire-Cienega Long-Term Management Area (LTMA). The LTMA was designed to encompass all the public lands within the Empire-Cienega RCA. BLM established the LTMA in the land tenure amendment to the Safford Resource Management Plan while these lands were being administered by the Tucson Resource Area of the Safford District Office. Under an LTMA designation, BLM retains public lands and blocks them up with other land acquisitions or conservation easements acquired from willing sellers. Appendix 2 discusses this plan amendment in more detail under the Description of Management Guidance Common To All Alternatives.

The Empire-Cienega Planning Area encompasses 266 mi^2 (170,558 acres) in southeast Arizona, roughly bounded by Interstate 10 on the north, Arizona State Highway 83 on the west, the Whetstone Mountains on the east, and the Audubon Society's Appleton-Whittell Research Ranch on the south (Map 1-2). Table 1-1 summarizes the acres by ownership within the planning area.

PLANNING PROCESS

THE SONOITA VALLEY PLANNING PARTNERSHIP

The Sonoita Valley Planning Partnership (SVPP) is a voluntary association of federal, state, and local agencies; organized groups; and people who share a common interest in the future of public land resources in the Sonoita Valley. Participants come from a variety of communities in southern Arizona, including Sonoita, Elgin, Patagonia, Huachuca City, Sierra Vista, Nogales, Tucson, and Phoenix. Participants also represent organized groups, including conservation organizations; grazing and mining interests; and hiking, bird-dog, mountain biking, and off-highway vehicle clubs. Agency representation has come from the BLM, Nogales, and Sierra Vista ranger districts of Coronado National Forest, Natural Resources Conservation Service, U.S. Geological Survey, Arizona Game and Fish Department, Arizona State Land Department, Pima County Parks and Recreation and Planning/Flood Control, and Santa Cruz County. The partnership is open to all; anyone can participate and can join at any time.

Table 1-1. Land Ownership, Empire-Cienega Planning Area

Land Ownership	Acres	Percentage
BLM	48956	28.7
State of Arizona	80706	47.3
Private	40896	24
TOTAL	**170558**	**100**

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The Sonoita Valley Planning Partnership was conceived as a way for the community (private, public, government, local, non-local) to come together to resolve local and national issues affecting public lands in the Sonoita Valley. The partnership has increased awareness, communication, understanding, trust, and support among its members. The partnership has also helped us look at the valley as a whole and determine what we want and need in the future.

ECOSYSTEM PLANNING AND THE COLLABORATIVE APPROACH

The Council on Environmental Quality regulations for implementing the National Environmental Policy Act (NEPA) direct that to the fullest extent possible federal agencies must encourage and facilitate public involvement in decisions that affect the quality of the human environment. Traditionally, BLM and other agencies have involved the public in planning at the initial scoping stage and have then "disappeared" until ready to ask for comments on a draft plan. This process resulted in many people thinking that their comments were ignored and to a lack of trust in the agencies and outcomes of the process.

In recent years, land use planning has made a major shift toward an ecosystem management approach. Under the ecosystem management approach, planning processes are more open to the public, and the public is involved early in the process. Interested parties are encouraged to help establish goals and determine ways to achieve them. Table 1-2 compares the traditional and ecosystem approaches to land use planning.

Table 1-2. Comparison of the Traditional and Ecosystem Planning Approaches to Land Use Planning

Traditional Approach	**Ecosystem Approach**
• Public involvement solicited at selected stages of plan development.	• Public involved throughout process.
• Emphasis on consultation.	• Emphasis on collaboration.
• Process based on issues that may lead to increased polarization.	• Process based on developing desired conditions for area (goals and objectives) leading to increased consensus building.
• Planning boundary based on agency jurisdictional boundary.	• Planning boundary based on ecosystem resources and processes and a blurring of jurisdictional boundaries.
• Traditional management focusing on analysis of conditions at one point-in-time leading to more rigid planning documents.	• Emphasis placed on adaptive management.
• Public involvement generally ends with completion of planning document.	• Continued public involvement in plan implementation and monitoring.

The Interagency Ecosystem Management Task Force in its 1995-1996 report, *The Ecosystem Approach: Healthy Ecosystems and Sustainable Economies,* recommended eight steps in the ecosystem approach. These steps are complementary to the National Environmental Policy Act (NEPA) and guide agencies in implementing and participating in ecosystem efforts:

1. Define the areas of concern or interest.

2. Involve stakeholders.

3. Develop a shared vision of the ecosystem's desired future conditions.

4. Characterize the historical ecosystem and the present environmental, economic, and social conditions and trends.

5. Establish ecosystem goals.

6. Develop and implement an action for achieving the goals.

7. Monitor conditions and evaluate results.

8. Adapt management according to new information.

In 1995 BLM's Tucson Field Office decided to take a new collaborative approach to planning for the Empire-Cienega Planning Area, with full public participation guided by these principles of ecosystem management. This approach resulted in the forming of the Sonoita Valley Planning Partnership (SVPP). This partnership met monthly for 4 years, focusing at first on developing a shared vision, goals, and specific objectives for the Sonoita Valley. In the last year and a half, the partnership focused on working with BLM to develop alternatives for managing the planning area.

Partnership participants were at first interested in the possibility of developing a broad ecosystem plan for the Sonoita Valley area. But early in the process, they realized that this goal was unattainable, at least in the short term. The focus then shifted to developing desired conditions, goals, and objectives that could be applied to the entire Sonoita Valley and incorporated in different planning efforts as they were undertaken. So far, two planning efforts have incorporated the desired conditions: this Las Cienegas Resource Management Plan and A Draft Comprehensive Plan for Northeastern Santa Cruz County, drafted by the Sonoita Crossroads Community Forum (2000).

SONOITA VALLEY PLANNING PARTNERSHIP OUTCOMES

To date the Sonoita Valley Planning Partnership has accomplished the following:

☐ Raised a variety of issues concerning public lands within the Sonoita Valley, including the following:

  - Mineral use and impacts.
  - Utility rights-of-way and other land uses.
  - Managing off-highway vehicles and road and trail networks.
  - Establishing and managing a segment of the Arizona Trail.
  - Managing outdoor recreation.
  - Managing visual resources.
  - Designating areas of critical environmental concern (ACECs).
  - Managing livestock grazing.
  - Maintaining water quality and quantity.
  - Managing riparian and upland vegetation.
  - Managing endangered species and fish and wildlife habitats.
  - Managing cultural/historical resources.

- Economics.

- Public education.

These issues, combined with those generated in earlier work on the Empire-Cienega planning effort, are described in more detail later in this chapter.

☐ Developed Desired Future Conditions for the Sonoita Valley, including the following:

- Vision statements for open space, water, healthy diverse grasslands, and traditional uses for the Sonoita Valley. These statements broadly define desired future conditions to maintain or reach in this valley.

- Broad goals for vegetation, wildlife, water, watershed, cultural resources, recreation, open space, traditional uses, and stewardship of resources. These goals can be applied to all lands within the Sonoita Valley.

- Specific, measurable objectives for upland and riparian vegetation, watershed, wildlife, cultural resources, and recreation opportunities. These objectives can be applied to all lands within the Sonoita Valley.

BLM has incorporated these desired future conditions as the foundation for this planning effort. These conditions are described in Chapter 2 before the descriptions of the four plan alternatives.

☐ Worked with BLM on developing alternative management strategies for the Empire-Cienega Planning Area. Included were strategies on the following:

- Mineral development

- Utility rights-of-way

- Off-highway vehicle (OHV) designations

- Roads and trails system

- Recreation zones and sites

- Visual resource management (VRM)

- Areas of critical environmental concern

- Livestock grazing

- Fish and wildlife management

- Vegetation management

- Cultural resources management

☐ Reached consensus on a preferred alternative that they would like to see BLM implement in the Empire-Cienega Planning Area.

☐ Provided input on BLM and Forest Service project proposals within the Sonoita Valley.

☐ Provided input to Sonoita Crossroads Community Forum for A Draft Comprehensive Plan for Northeastern Santa Cruz County.

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RELATIONSHIP TO OTHER AGENCY PLANS (WITHIN AND OUTSIDE BLM)

SONOITA CROSSROADS COMMUNITY FORUM

Over the past 10 years the Sonoita Valley, including the unincorporated towns of Elgin and Sonoita, has undergone unprecedented growth as more people have discovered the area's scenic open spaces, pleasant climate, and recreational opportunities. Many residents descend from families who homesteaded this area and still raise livestock and engage in other traditional rural lifestyles. Many of the newer residents commute to Tucson, Sierra Vista, and Nogales. A diverse group, these residents share a common interest in maintaining the traits that they value in the Sonoita Valley. In March 1996, with the support of the Sonoran Institute, residents established the Sonoita Crossroads Community Forum to discuss local values and work toward resolving the area's many issues relating to rapid growth.

In April 2000, the Sonoita Crossroads Community Forum released A Draft Comprehensive Plan for Northeastern Santa Cruz County. This plan includes policies and strategies for building effective partnerships between the community and land management agencies; maintaining open space and rural character; and promoting quality development, both commercial and residential, at the Sonoita Crossroads. The group's intent is to have its plan adopted as part of the Santa Cruz County Comprehensive Plan.

EMPIRE RANCH FOUNDATION

The Empire Ranch Foundation, a nonprofit corporation, was established in 1997 to improve the public's historic, natural, and recreational resources and educational experience at the Empire Ranch. Initially the Foundation is focusing on securing funding to stabilize and eventually restore the historic Empire Ranch headquarters. As part of this effort, the Foundation is helping develop a phased adaptive use plan (master plan) for the complex. This plan determines public uses of the complex, including interpretive, educational, research, administrative, and program support, at a level compatible with other resource goals.

CORONADO NATIONAL FOREST

The Empire-Cienega Planning Area is bounded on three sides by national forest lands within two units of Coronado National Forest. To the west is the Nogales Ranger District, and to the east and south is the Sierra Vista Ranger District. The Coronado National Forest Plan (Forest Service 1986) is the comprehensive land use plan defining management direction for these lands. The intended life of the plan was 10-15 years, and the plan is now due for revision.

PLANNING ISSUES

Twelve major planning issues were generated for the Empire-Cienega Planning Area from initial public scoping, the collaborative planning process, and BLM interdisciplinary team members. These issues can be grouped into three categories relating to (1) desired future conditions, (2) land use allocations, and (3) special designation areas.

Desired future conditions include the following:

- Goals that are generally broad statements of desired outcomes.
- Standards that describe the physical and biological condition or degree of function a

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resource must meet to sustain ecological processes.

- Objectives that state specific, measurable desired conditions for resources.

Land use allocations include determining allowable uses and broad use levels such as surface lands where certain uses are allowed or excluded. Special designations are proposed for areas with nationally, regionally, or locally significant resources where special management attention is needed, such as areas of critical environmental concern.

Following the description of each major planning issue are the related implementation issues. BLM would apply laws, regulations, and its public land planning and management guidance in resolving these issues. This management guidance, also known as planning criteria, is summarized in Chapter 2 and described in more detail in Appendix 2.

ISSUES REGARDING DESIRED RESOURCE CONDITIONS

Watershed: Upland, Riparian, Aquatic Areas

BLM's Fundamentals of Rangeland Health (43 CFR 4180) provide direction for the development of resource objectives and the selection of appropriate management actions to achieve them. The Fundamentals of Rangeland Health include having watersheds that are in, or are making significant progress toward, properly functioning physical condition, including their upland, riparian-wetland, and aquatic components. These fundamentals also encompass the ecological processes of watersheds. These processes include the hydrologic cycle, nutrient cycle, and energy flow that are maintained, or toward whose attainment significant progress must be made to support healthy biotic populations and communities. BLM Arizona's standards for achieving rangeland health include ensuring proper functioning condition and desired vegetation condition of upland and riparian areas according to sound management practices (guidelines).

Issue 1: What level of resource use within upland areas would be compatible with ensuring maintenance or improvement of desired conditions?

Related implementation issues (watershed/upland):

a. To what extent should we use fire and other tools or allow natural fires to reduce the spread of exotic or undesirable native plants in the grassland?

b. How do we ensure fire protection for residents while conducting public land fire management activities?

c. Accounting for climactic variability (drought) in proposals.

d. Poor upland management practices in some areas.

e. Depletion of vegetation in some areas (concentrated use areas).

Issue 2: What level of resource use within riparian (streamside) areas would be compatible with ensuring maintenance or improvement of desired conditions?

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Related implementation issues (riparian):

a. Diversion, consumption, and extraction of water as they relate to maintaining perennial water in creeks.

b. Impacts on water recharge factors from soil and vegetation conditions.

c. Ensuring protections for sensitive riparian areas in proposals.

d. Are there impacts from manure (nonpoint source) on water quality? If so, how do we eliminate or minimize impacts to ensure that we meet quality standards?

e. Are there problems with sediment load in streams in the planning area and are sediment loads affecting water quality? If so, what measures can we take to reduce impacts?

    i. High sediment loads in Apache, Fresno, Wood, Gardner, and Springwater Canyons are a concern.

    ii. Mattie Canyon down-cutting from recent flooding may affect upstream portions of Mattie Canyon as well as Cienega Creek downstream from the confluence.

Issue tracking:

Chapter 2 (Alternatives): The Land Use Plan section of each alternative prescribes desired condition goals and objectives for watersheds and upland and riparian areas. Common to Alternatives 2, 3, and 4 are specific management actions for achieving and maintaining desired vegetation conditions, including vegetation treatments, control of exotics, and watershed restoration projects. These actions are listed in the Activity Plan for Alternative 2 and referenced in the other alternatives.

Chapter 3 (Affected Environment): The watershed, upland vegetation, and riparian vegetation sections describe these resources and their conditions.

Chapter 4 (Impacts): The Impacts ***to*** *watershed, water quality, upland vegetation, and riparian vegetation sections describe impacts to these resources from each of the alternatives. The relevant sections also describe impacts* ***from*** *watershed and upland and riparian vegetation management on other resources and users.*

Fish and Wildlife Habitat Management

The Empire-Cienega Planning Area provides habitat for at least 37 special status species, including 11 federally listed or candidate species that need special attention. In addition, the diversity of habitats supports a wide variety of more common game and non-game fish and wildlife species. If not properly managed, other uses of the public lands can damage wildlife habitat. BLM's Fundamentals of Rangeland Health (43 CFR 4180) includes having habitats that have been or are making significant progress toward being restored or maintained for federal threatened and endangered species, federal proposed and candidate species, and other special status species. BLM Arizona's standards for achieving rangeland health include ensuring that productive and diverse upland and riparian-wetland plant communities of native species exist and are maintained.

Issue 3: How can we maintain healthy native wildlife populations and critical wildlife areas?

Related implementation issues:

a. Are available natural water sources adequate for wildlife, or do we need to enhance natural waters or develop artificial water sources to maintain and enhance wildlife populations?

b. What role should the planning area play in the recovery of endangered and extirpated fish, wildlife, and plant species? What priority should we give endangered species recovery?

c. What management is needed to mitigate adverse impacts to wildlife movements from human development and activities now and in the future?

   i. Do we need more fence modifications to mitigate impacts on wildlife movements?

   ii. Do we need seasonal closures or restrictions on roads or other uses to mitigate impacts on wildlife movements?

d. What are the causes of the low antelope reproduction, and what management should we consider to improve antelope reproductive rates (fawn survival)?

   i. Do we need to close roads seasonally or restrict other uses?

   ii. Is vegetation cover adequate for fawning?

   iii. Are available water sources adequate?

e. How should we control or manage exotic fish and wildlife to eliminate or minimize harm to native fish and wildlife?

   i. Bullfrogs in Cienega Creek and ponds in the watershed may harm native fish and aquatic wildlife.

f. What vegetation cover types and compositions should we manage for within the planning area to benefit wildlife?

   i. Past management practices have changed the condition, aspect, and distribution patterns of vegetation communities from what was historically present.

   ii. Adequate vegetation cover for antelope fawning may not be present each year.

   iii. Adequate vegetation cover for grassland sparrows may not be present each year.

Issue tracking:

Chapter 2 (Alternatives): The Land Use Plan section of each alternative prescribes desired condition goals and objectives for fish and wildlife as well as land use allocations to support proposals for reintroducing threatened and endangered species. Common to Alternatives 2, 3, and 4 are specific management actions for fish and wildlife, including habitat improvements, control of exotic species, and constraints on grazing and recreation. These actions are listed in the Activity Plan for Alternative 2 and referenced in the other alternatives.

Chapter 3 (Affected Environment): The Fish and Wildlife section describes biological diversity and conditions of fish and wildlife habitats (including those of threatened, endangered, and special status species).

*Chapter 4 (Impacts): The Impacts **to** Fish and Wildlife section describes impacts to fish and wildlife (including threatened, endangered, and special status species) from each of the alternatives. Relevant sections also describe the impacts **from** fish and wildlife management on other resources and users.*

Visual Resources

Crossing the Empire-Cienega Planning Area is State Highway 83, a designated scenic route in the State Highway System. The planning area also provides most of the viewshed from Highways 82 and 83 between the Whetstone and Santa Rita mountains. A Draft Comprehensive Plan for Northeastern Santa Cruz County, prepared by the Sonoita Crossroads Community Forum (April

2000) recognized public lands in the planning area in Santa Cruz County as having high visual resource preference values. The planning area has no significant visual intrusions on public lands. Currently there are no designated visual resource management (VRM) classifications, but generally the planning area fits into VRM category II and III (Appendix 2).

Issue 4: What should be the VRM designation on the public lands within the planning area to maintain visual resource values ?

Issue tracking:

Chapter 2 (Alternatives): The Land Use Plan section of each alternative prescribes desired conditions for visual resources using Visual Resource Management classes.

Chapter 3 (Affected Environment): The Visual Resources section describes the quality of visual resources in the planning area.

Chapter 4 (Impacts): The Impacts ***to*** *Visual Resources section describes impacts to visual resources from each of the alternatives. The relevant sections also describe impacts* ***from*** *visual resource management on other resources and users.*

Cultural Resources

Dating back more than 7,000 years, the planning area's cultural resources include prehistoric and historic sites. The Empire Ranch House is a National Register site. BLM employs a management system to protect and preserve cultural resources on public land and areas of agency responsibility. The system allows scientific, public, and sociocultural uses specified under legal mandates, acts, regulations, and agency policy.

Issue 5: Which cultural resource properties should be allocated for research, educational, and interpretive uses?

Issue tracking:

Chapter 2 (Alternatives): The Land Use Plan section of each alternative prescribes desired condition goals and objectives for cultural resources. The activity plan for each alternative prescribes specific management actions for cultural resources, including allocations of sites.

Chapter 3 (Affected Environment): The Cultural Resources section describes the length and evidence of human occupancy in the planning area and the condition of cultural and paleontological resources.

Chapter 4 (Impacts): The Impacts ***to*** *Cultural Resources section describes impacts to cultural resources from each of the alternatives. Relevant sections also describe the impacts* ***from*** *cultural resource management on other resources and users.*

Economics/Quality of Life

The Sonoita Valley Planning Partnership's vision statement reflects the desire of the diverse participants to maintain the area's rural character. In addition, the Sonoita Crossroads Community Forum states in its community goal for integrating open space in developments that maintaining an open rural character is essential to the community's quality of life, market appeal, and property values. The planning area's public lands significantly contribute to the area's open space character. Management decisions for these lands could affect this character as well as the area's economic development.

Issue 6: What types and levels of resource use and management are compatible with ensuring the maintenance of desired economic and quality-of-life conditions?

Related Implementation Issues

a. How do our actions reflect on the economics of the region, both private and public?

b. How will growth affect the area and its uses, and will growth allow for sustainability of resources?

c. How will attitudes (expectations, balance, respect, communication, rural versus urban, education) affect the area and its uses?

Issue tracking:

Chapter 3 (Affected Environment): The Social and Economic Concerns section describes quality/way of life, population and demographics, local and regional economy, employment, and environmental justice.

Chapter 4 (Impacts): The Impacts ***to*** *Social and Economic Concerns section describes impacts to socioeconomic conditions from each of the alternatives.*

ISSUES RELATED TO LAND USE ALLOCATIONS

Mining

All public lands within the planning area are closed to mining except for 458 acres of original public domain and 5,900 acres of federal mineral estate with private or state surface ownership.

Issue 7: Should any acquired lands be opened to locatable or leasable mineral development? If mining is not allowed, should public domain lands now open to mining be withdrawn? If mineral development is allowed, should surface occupancy for fluid mineral leases be prohibited in any areas? Should any areas be open to salable mineral disposal?

Related Implementation Issues:

a. How will the opening of any new mine affect watershed health?

Issue tracking:

Chapter 2 (Alternatives): The Land Use Plan section of each alternative allocates land for mineral development.

Chapter 3 (Affected Environment): The Mineral Development section describes the area's mineral potential and existing mineral development.

Chapter 4 (Impacts): The Impacts ***to*** *Mineral Development section describes impacts to mineral development from each of the alternatives. Relevant sections also describe impacts* ***from*** *mineral development on other resources and users.*

Utility Corridors

One use of public lands is for major utility corridors such as power or gas lines. BLM's goal is to ensure that needed utility corridors can be developed without harming significant public resources. Two major utility rights-of-way already cross the planning area. Recently, with the deregulation of the power and communication industries, requests to route electric and fiber optic lines across public lands have dramatically increased. A Draft Comprehensive Plan for Northeastern Santa Cruz County prepared by the Sonoita Crossroads Community Forum (2000), states that "construction of overhead high voltage power lines that do not provide local service is not consistent with the open space and scenic values that attract residents and visitors to our community" and that "If a high voltage power line is permitted, its construction should be mitigated through the protection of remaining scenic values."

Issue 8: What public land, if any, should BLM designate as utility corridors in the Empire-Cienega Planning Area?

Related Implementation Issue:

a. How will BLM accommodate public land uses such as rights-of-ways for utilities while ensuring that it achieves desired resource conditions?

Issue tracking:

Chapter 2 (Alternatives): The Land Use Plan section of each alternative allocates land for utility corridors.

Chapter 3 (Affected Environment): The Lands and Realty Actions section describes existing utility rights-of-way and other land use permits.

*Chapter 4 (Impacts): The Impacts **to** Land Use Permits section describes impacts to development of utility corridors and other land use permits from each of the alternatives. Relevant sections describe the impacts **from** developing utility rights-of-way and issuing land use permits.*

Off-Highway Vehicles (OHV)

The use of off-highway vehicles (OHVs) continues to increase on the public lands, including those within the Empire-Cienega Planning Area. The interim management guidelines for the area restrict motorized vehicles to designated roads. But BLM has never fully implemented this designation. To help manage rapidly expanding motorized vehicle use, in 1999 BLM developed an access guide (map/brochure) for the area and partially implemented a road numbering system. Both actions were funded by a grant from the Arizona State Park's OHV program. The planning area offers high-quality OHV experiences, but vehicles are increasingly and illegally traveling off established roadways, damaging resources in the process.

Issue 9: What public land should be proposed as open, closed, or limited in some way to motorized vehicles? (OHV designations are usually (1) open, (2) limited to existing roads, (3) limited to designated roads, or (4) closed.)

a. Vehicles crossing perennial portions of Cienega Creek and associated recreational use are harming fish, wildlife, and riparian areas.

b. Many duplicate routes for travel to the same locations within the planning area increase the potential for impacts to vegetation, wildlife, and cultural resources.

c. Throughout the public lands, "wildcat" roads and camp areas created by illegal off-road vehicle use damage resources.

Issue tracking:

Chapter 2 (Alternatives): The Land Use Plan section of each alternative allocates areas for use by off-highway vehicles. The activity plans for each alternative describe the designated routes for motorized and non-motorized travel.

Chapter 3 (Affected Environment): The Outdoor Recreation section describes visitor use (including off-highway vehicle use) and access.

Chapter 4 (Impacts): The Impacts ***to*** *Outdoor Recreation section describes impacts to recreation opportunities and access from each of the alternatives. Relevant sections describe the impacts* ***from*** *off-highway vehicle designation on other resources and users.*

Recreation Zones

The planning area has a variety of recreation uses, increasing visitor levels, and a high potential for resource conflicts. Recreation zones are designated to maintain or enhance recreation opportunities. These zones can be used to prescribe recreation management across concentrated and dispersed recreation areas.

Issue 10: What public land should be proposed for designation as recreation zones for varied recreation opportunities and management strategies?

Related Implementation Issues:

a. How should BLM manage recreation to limit harm to fish, wildlife, and vegetation?

    i. In Oak Tree Canyon, campfires and the parking of vehicles under the trees are harming the oaks.

    ii. Throughout the public lands, illegal off-road vehicle use is creating "wildcat" roads and camp areas, which damage resources (same as issue "c" under off-highway vehicles).

    iii. Vehicles crossing perennial portions of Cienega Creek and associated recreational use are harming fish, wildlife, and riparian areas (same as issue "a" under off-highway vehicles).

    iv. Recreation may harm some of the federally listed or other special status species.

b. How can BLM continue to assure public access?

c. How can BLM assure the quality of recreational opportunity settings and experiences for a variety of users?

d. What types of trails and uses should BLM allow and provide?

e. How will BLM accommodate proposals for the Arizona Trail?

f. How will BLM educate visitors?

g. Visitor safety concerns:

    i. Some people drive their vehicles too fast for road conditions, creating hazards for other vehicles, non-motorized users, and livestock.

    ii. Visitors to existing sites with picnic tables (Empire Gulch and North Canyon) are endangered by branches that could drop from large cottonwoods.

    iii. Signs are not effectively closing hazardous roads with sinkholes adjacent to Cienega Creek (Fall area).

Issue tracking:

Chapter 2 (Alternatives): The Land Use Plan section of each alternative allocates recreation zones. The activity plans for each alternative describe management within these zones, including designated group sites and camp areas, road maintenance, visitor education, and management of dispersed recreation.

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Chapter 3 (Affected Environment): The Outdoor Recreation section describes visitor use (including off-highway vehicle use) and access.

Chapter 4 (Impacts): The Impacts ***to*** *Outdoor Recreation section describes impacts to recreation opportunities and access from each of the alternatives. Relevant sections also describe impacts* ***from*** *recreation zone designation and management on other resources and users.*

Livestock Grazing

BLM has five active grazing leases within the planning area. One of these is covered under the Safford Resource Management Plan (BLM 1991)/Eastern Arizona Grazing EIS (BLM 1986). The remaining four are on the recently acquired lands within the planning area and need to be addressed in this planning effort. In addition, a sixth grazing allotment has been proposed for BLM-managed lands in the Empire Mountains. The Sonoita Crossroads Community Forum and participants in the Sonoita Valley Planning Partnership recognized the Sonoita Valley area's ranching heritage as a factor contributing to the area's character. People and groups have also expressed concern about conflicts between livestock grazing and wildlife species and habitats.

Issue 11: Which areas should be grazed or not grazed? For grazed areas, what level of use is proper for achieving and maintaining desired conditions?

Related Implementation Issues:

a. How does livestock grazing affect the ecosystem, and does livestock grazing conflict with maintaining and improving vegetation resources?

b. How do we resolve wildlife-livestock conflicts?

   i. Adequate cover may not be present for antelope fawning and for grassland sparrows each year.

   ii. Livestock grazing may harm federally listed or other special status species.

Issue tracking:

Chapter 2 (Alternatives): the Land Use Plan section of each alternative allocates land for livestock grazing. The activity plans for each alternative describe livestock grazing management within each grazing allotment, including grazing system, stocking rate, utilization, and range improvements.

Chapter 3 (Affected Environment): The Upland Vegetation section describes the current conditions of the range. The Livestock Grazing section describes existing livestock grazing allotments and management.

Chapter 4 (Impacts): The Impacts ***to*** *Livestock Grazing section describes impacts to livestock grazing operations from each of the alternatives. Relevant sections also describe impacts* ***from*** *livestock grazing on other resources and users.*

ISSUES RELATING TO SPECIAL DESIGNATIONS OF PUBLIC LANDS

Areas of Critical Environmental Concern

The planning area contains many resources of special significance. BLM can designate lands as areas of critical environmental concern (ACECs) if they have more than locally significant resources or resource concerns. BLM then prescribes management guidelines for ACECs to protect their special resources. The following are examples of ACECs:

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- Areas with significant wildlife, rare plants, or wetlands.

- Areas with significant historical, cultural, or paleontological resources.

- Areas with hazardous conditions.
- Research areas.

BLM has received several proposals for designations of ACECs within the planning area during scoping for this planning effort. Two proposals were for designating Cienega Creek as an ACEC for its riparian values and one proposal was for an ACEC at Nogales Springs for its riparian values. The Sonoita Valley Planning Partnership process proposed designating all the planning area's public lands as an ACEC.

Issue 12: What public land in the Empire-Cienega Planning Area should BLM designate as areas of critical environmental concern (ACECs) or for other special management?

Issue tracking:

Chapter 2 (Alternatives): The Land Use Plan section of each alternative proposes designating areas of critical environmental concern (ACECs). The activity plans for each alternative describe the ACEC management plans.

Chapter 3 (Affected Environment): The Special Designations section describes the current special designation areas, including ACECs and wild and scenic river segments.

Chapter 4 (Impacts): The Impacts ***to*** *Special Designations section describes impacts to existing ACECs and wild and scenic river segments from each of the alternatives. Relevant sections also describe the impacts* ***from*** *designating new ACECs on other resources and users.*

ISSUES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

a. Impacts from sewage (point source) on water quality.
Managing sewage is not within the scope of this planning effort. County planning and zoning departments regulate these impacts by issuing building permits and inspecting construction and related infrastructure.

b. Impacts from industrial chemicals (such as cyanide from mining) on water quality.

   The Environmental Protection Agency and Arizona Department of Environmental Quality regulate industrial chemicals, including those from mining. BLM would consider these potential impacts in assessing any mining plans of operations.

c. Enforcement: How will use be policed and who will do it (limitation, permits, designated areas, etc.)

   BLM generally has limited law enforcement coverage of public lands. The amount and level of coverage for any area is based on many factors, including public safety, sensitivity of resources, level of public use, and workforce and budgetary constraints.

d. How do honeybees and bee-keeping affect the ecosystem?

This question has been placed in the Information Needs section of Chapter 2.

e. What changes in management practices do we need to sustain wildlife populations and still have hunting?

Hunting is regulated by the Arizona Game and Fish Commission, which sets harvest limits in response to an analysis of harvest and population data collected by the Arizona Game and Fish Department (AGFD). BLM and AGFD regularly coordinate on habitat conditions or management practices that may be harming wildlife populations. They then work toward resolving those issues.

f. The planning area needs proactive management to compensate for impacts from surrounding land uses.

This draft Las Cienegas Resource Management Plan describes four alternative management strategies that include many proactive strategies to compensate for impacts from surrounding land uses. Some examples include vegetation treatments, control of exotic species invasions, coordination with other agencies or land owners in the watershed, instream flow applications, and recreation zone management.

g. How to plan for the number of uses versus type of use (per capita use) and for increased uses.

This draft Las Cienegas Resource Management Plan has included management strategies that consider increased uses and balancing types and levels of resource uses. Two examples are (1) utility corridors, which consider the increasing demands for routing utility lines across public lands, and (2) recreation zones and site management, which consider the increasing number and types of recreation users on the public lands.

h. Land Tenure: Should public lands within the planning area be retained? Should more public lands be acquired?

The Land Tenure Amendment to the Safford RMP (BLM 1994b) analyzed this issue for the public lands within the Empire-Cienega Planning Area. When the Land Tenure Plan Amendment was completed, the Safford Field Office administered the planning area. The plan amendment designated long-term management areas (LTMAs) where public lands would be retained and blocked up with other land acquisitions or conservation easements. The Empire-Cienega Planning Area is one of the LTMAs designated in the plan amendment. The LTMA designation and management prescriptions are common to all alternatives in the Draft Las Cienegas Resource Management Plan. Appendix 2 includes a more detailed discussion of this plan amendment under Description of Management Guidance Common To All Alternatives.

i. Local Growth Issues (Zoning, Business/Commercial Area, Types of Housing, Infrastructure)

These issues relating to private lands and local growth have been addressed by the Sonoita Crossroads Community Forum (2000) in A Draft Comprehensive Plan for Northeastern Santa Cruz County.

j. Wilderness

Because the public lands in the planning area were reconveyed from private ownership after the statewide wilderness review was completed for BLM lands in Arizona, potential wilderness values were not inventoried. An initial review was completed for this planning process to determine if the area contains potential wilderness values by applying the size and roadless criteria (> 5000 roadless acres). The existing system of roads was inventoried for transportation planning purposes. The planning area includes a contiguous block of public land over 5000 acres in size, but an extensive system of existing roads crosses public land dividing it into numerous sub-units. Four sub-units greater than 5000 acres were identified, but these are entirely private or State Trust lands, or a combination of both. The largest sub-unit comprised of BLM land is just over 4,000 acres and is bounded on two sides (north and east) by the South Road (EC-900) and on the south by State Highway 82. Since this sub-unit does not meet the size criteria, further wilderness review is not required and wilderness is not an issue analyzed in this EIS.

k. Rain Valley Allotment (number 5297)

The Rain Valley grazing allotment consists of 160 acres of BLM land and has 1 cow year-long (CYL) allocated. The public lands within this grazing allotment are part of the Safford Planning Unit and were included in the Safford RMP and the Eastern Arizona Grazing EIS. The 160 acres were included in the Empire-Cienega Long-Term Management Area which was designated in the Land Tenure amendment to the Safford RMP and therefore were included within the Empire-Cienega planning boundary. These public lands are covered under an existing RMP and already analyzed in an EIS; no specific issues were identified with these lands; and no management changes are proposed for this allotment; therefore it is not being analyzed in this EIS.

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CHAPTER 2

DESCRIPTION OF ALTERNATIVES

A doorway in the historic Empire Ranch headquarters frames a view of the natural vegetation.

CHAPTER 2
DESCRIPTION OF ALTERNATIVES

INTRODUCTION

Chapter 2 describes four alternative integrated management plans for public lands within the Empire-Cienega Planning Area and summarizes the expected impacts to the environment resulting from implementing each of the alternatives.

The first section of Chapter 2 summarizes management guidance common to all alternatives. Regardless of the alternative it selects as the approved plan, BLM would follow this management guidance, which consists of laws, regulations, and policies.

The next section of Chapter 2 describes the desired future conditions for the Empire-Cienega Planning Area. These conditions are the foundation for the integrated management plan. Each action alternative consists of proposed management strategies for achieving and maintaining the desired future conditions while providing for differing but compatible levels of human use.

Chapter 2 then discusses each alternative management plan in detail. This section is divided into two parts. Part A describes proposals at the resource management plan (RMP) level (generally broader resource allocations) for each alternative. Part B describes proposals at the activity plan level (on-the-ground management actions) that would be implemented for each alternative. Each part begins with a description of the No Action Alternative of continuing current management followed by descriptions of three alternative proposals (action alternatives). Together, the two parts of each alternative constitute a complete plan to guide management of the public land resources and uses.

Each of these alternative plans would implement an adaptive management strategy. As BLM obtains new information, it would evaluate monitoring data and other resource information to periodically refine and update desired conditions and management strategies. For this reason, the four alternative management plans each represent a set of strategies that BLM could employ at a particular time and that were selected from the full spectrum of possible strategies under an adaptive management scenario.

The next section of Chapter 2 describes the monitoring program and plan evaluation process which would be used to support the adaptive management strategy.

Chapter 2 then describes inventories or studies needed or desirable before implementing some of the management actions.

The last section of Chapter 2 summarizes the potential environmental impacts of each alternative as a reference for comparing impacts.

MANAGEMENT GUIDANCE COMMON TO ALL ALTERNATIVES

SUMMARY OF MANAGEMENT GUIDANCE

Regardless of the alternative chosen, BLM's management of public lands and resources is governed by many laws, regulations, and policies. Although not all of these can be summarized in this document, Table 2-1 summarizes the major laws, regulations, and policies that apply to the

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Table 2-1. Laws and Regulations Relating to the Las Cienegas Resource Management Plan

Law/Regulation	Applies to
American Indian Religious Freedom Act (AIRFA) 42 USC @ @1996	Native American religious places and access
Archeological Resources Protection Act (ARPA) 16 USC @ @470	Archaeological resources
Clean Air Act (CAA) of 1970, as amended 1990 42 USC @ @7401 et seq.	Air quality
Clean Water Act (CWA), as amended 33 USC @1252 et seq.	Surface water quality
Endangered Species Act (ESA) 16 USC @ @1531 et seq., as amended	Threatened and endangered species
Federal Land Exchange Facilitation Act of 1988 (FLEFA), 43 USC @1716, @1740	Federal land exchanges
Federal Land Policy and Management Act (FLPMA), 43 USV @1701	Federal lands, special management areas
Federal Noxious Weed Act of 1974, as amended	Noxious weeds
Federal Pollution Control Act, as amended 1972	Watersheds
Land and Water Conservation Fund Act of 1965	Outdoor recreation
Mining and Mineral Policy Act of 1970	Mining
Mining Law of 1872, as amended	Mining claims
National Environmental Policy Act (NEPA) 42 USC @ @4321 et seq., as amended	Federal undertakings
National Historic Preservation Act (NHPA)	Archaeological and historic properties
National Materials and Minerals Policy Research Development Act of 1980	Mineral resources
Public Rangelands Improvements Act of 1978	Rangeland and wildlife management
Resource Conservation and Recovery Act of 1986, as amended (RCRA)	Hazardous or solid waste
Sikes Act	Fish and wildlife management
Soil Conservation and Domestic Allotment Act of 1935	Watersheds
Taylor Grazing Act of 1934	Livestock grazing
Water Quality Act of 1987	Riparian areas, wetlands
Watershed Protection and Flood Control Act of 1954	Watersheds
Wild and Scenic Rivers Act (WSRA) 16 USC @1271 et seq.	Wild and scenic rivers
Secretary of the Interior Order 3175	Indian trust assets
Executive Order 11593	Preservation of the cultural environment
Executive Order 11988	Floodplain management
Executive Order 11990	Wetlands, riparian zones

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Table 2-1, continued. Laws and Regulations Relating to the Las Cienegas Resource Management Plan

Law/Regulation	Applies to
Executive Order 12898	Environmental justice
Executive Order 13007	Sacred sites
Executive Order 13112	Invasive species

resources and proposals being analyzed in this plan amendment/EIS. Appendix 2 describes in more detail the major resource programs and management guidance.

ENVIRONMENTAL MANAGEMENT

In compliance with National Environmental Policy Act and Council on Environmental Quality regulations, BLM will prepare site-specific environmental reviews before implementing actions proposed in this RMP amendment/EIS. The environmental reviews will include "means to mitigate adverse environmental impacts" of the proposed action according to 40 CFR 1502.16(h). The environmental reviews provide site-specific assessments of the impacts of implementing these actions. As suitable, these reviews are documented in the following:

- Administrative determinations.
- Categorical exclusion reviews.
- Environmental assessments and decision records or EISs and records of decision.

In addition, BLM will ensure that the environmental review process includes evaluation of all critical elements, including cultural resources and threatened and endangered species, and completes required State Historic Preservation Office (SHPO) and U.S. Fish and Wildlife Service Section 7 consultations. The review also determines the mitigation needed to reduce or eliminate the adverse impacts of implementing a proposed action. All environmental documents are open to public review at the Tucson Field Office.

DESIRED FUTURE CONDITIONS

The Sonoita Valley Planning Partnership developed a vision, goals, and resource objectives for the Sonoita Valley area (roughly the upper Cienega Creek basin and small portions of the upper Babocomari and Sonoita Creek basins) to be incorporated into planning efforts for the valley. As a participant in the planning partnership, BLM's Tucson Field Office has incorporated the vision, goals, and objectives as the foundation for the Las Cienegas Resource Management Plan. The Tucson Field Office has also designed each action alternative to achieve or maintain these future conditions by meeting resource objectives.

PLANNING AREA VISION AND GOALS

Vision Statement of the Sonoita Valley Planning Partnership

> *The Sonoita Valley Planning Partnership will work together to perpetuate naturally functioning ecosystems while preserving the rural, grassland character of the Sonoita Valley for future generations.*

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Goals for the Sonoita Valley (Upper Cienega Creek Watershed)

1. Maintain and improve watershed health.
2. Maintain and improve native wildlife habitats and populations.
3. Maintain and restore native plant diversity and abundance.
4. Protect water quality.
5. Protect water quantity.
6. Assure sustainability and a complementary relationship of mineral resources to the protection of water quality and quantity.
7. Maintain the region's scenic beauty and open spaces.
    a. Protect the Empire-Cienega Resource Conservation Area and the integrity of public lands in the Sonoita Valley.
    b. Maintain the character of the Empire-Cienega Resource Conservation Area by limiting the building of any new roads or structures; maintaining the existing road system in its primitive character and condition; using existing road conditions to help control speed while providing sufficient recreational opportunities.
    c. Alter or upgrade existing roads where needed to protect natural resources on public lands in the Sonoita Valley.
    d. Encourage interaction and cooperation with other agencies and land owners, including acquiring land to protect and enhance the region's scenic beauty.
8. Sustain compatible traditional, current, and future use of the land.
    a. Ensure a range of outdoor recreation opportunities that will protect natural resources on all public lands in the Sonoita Valley.
    b. Develop and implement an education program to disseminate user guidelines that encourage responsible use of the public lands in the Sonoita Valley.
    c. Establish a Sonoita Valley trail system to promote dispersed recreation and minimize user conflicts.
    d. Plan, develop, and provide long-term stewardship of the Arizona Trail with community involvement. Priority should be given to developing alternative routes through the Empire-Cienega Planning Area from Oak Tree Canyon to Interstate Highway 10. Establish a primitive, non-motorized route for a diversity of users and provide outstanding opportunities for trail-based recreation.
9. Promote stewardship of the resources to accommodate current and future opportunities and demands.
    a. Encourage working partnerships between BLM and other agencies, users, groups, and interests.
    b. Develop maps, signs, and educational literature to promote user stewardship on public lands within the Sonoita Valley.
10. Manage the cultural resources in the planning area in a manner that provides for their preservation and protection and also avails

selected properties for scientific, public, and sociocultural uses.

RESOURCE OBJECTIVES FOR THE SONOITA VALLEY (UPPER CIENEGA CREEK WATERSHED)

Desired Upland Vegetation Condition

The upland vegetation structure of the Sonoita Valley is a dynamic mixed shrub savanna where the dominance of desirable native perennial grasses is emphasized. Native trees, shrubs, and succulents are also a part of the natural community. The relative abundance of each species results from the interaction of soils, climate, disturbance regimes, and competition among plant species.

When vigorous, this vegetation provides a ground cover of living plants and organic matter. This ground cover encourages precipitation to infiltrate the soil and reduces evaporation of moisture from the soil surface. The vegetation stabilizes soils and limits erosion to natural levels. The mosaic of diverse plant communities favors the production of high-quality water, wildlife, livestock, and fish habitats, recreation opportunities, and a refuge from urban settings.

Watershed and Upland Vegetation Objective

The watershed and upland vegetation objective covers the NRCS ecological sites within the Sonoita Valley (Major Land Resource Area D-41-3 Southern Arizona Semidesert Grassland, 12-16 inch precipitation zone; and D-41-1 Mexican Oak-Pine Woodland and Oak Savannah, 16-20 inch precipitation zone) (Appendix 3).

a. *Desired Plant Communities - Maintain or achieve properly functioning upland condition and a high similarity index (> 50%, by weight) to the historic climax plant community present on the site on 80% or more of the ecological sites in the Sonoita Valley by the year 2015.*

b. *Desired Ground Cover - Maintain or Achieve the following ground cover on 80% or more of the ecological sites in the Sonoita Valley by the year 2015:*

   Within Major Land Resource Areas 41-1 and 41-3 maintain or achieve ground cover in woodland communities in excess of 60% (<40% exposed soil surface), in grassland communities in excess of 70% (<30% exposed soil surface), and in shrubland communities in excess of 40% (<60% exposed soil surface).

Rationale: The present plant community on an ecological site can be compared to the vegetation states that can exist on the site. One can compare existing to potential vegetation through a similarity index expressed as the percentage of the desired plant community present on the site. The similarity index to historic climax provides a measurement of change that has occurred and shows how climate and management have affected a site's plant community. For each site the Natural Resources Conservation Service develops and maintains the ecological site descriptions, which describe historic climax plant communities. BLM will determine the present vegetation condition from ecological site inventories using the Natural Resources Conservation Service (NRCS) ecological site descriptions in its *Range and Pasture Handbook* (NRCS and Grazing Lands Technology Institute 1997).

Watershed Health: Watershed health largely depends on vegetation community composition and vigor, which affect hydrological relationships. Soil cover consists of plants, plant litter, gravel, and rock. Infiltration and runoff, soil structure, soil moisture, and aquifer recharge are properly balanced only when cover is sufficient.

Rangeland Health: The goals, objectives, and actions presented in this plan are intended to meet or exceed the standards required in the BLM's Standards and Guidelines for Rangeland Health in Arizona. BLM developed these standards and guidelines in consultation with Arizona's Resource Advisory Council and others.

The fundamentals of rangeland health combine the precepts of physical function and biological health with elements of law relating to water quality and plant and animal populations and communities. These fundamentals give the direction for developing resource objectives and selecting proper management actions to meet these objectives. The Arizona standards and guidelines meet the requirements and intent of 43 Code of Federal Regulations, Subpart 4180 (Rangeland Health). These standards and guidelines are intended to clearly state BLM's policy and direction for public land users and for those responsible for managing the public lands and accountable for their condition. (See Appendix 2 for additional text on the BLM's Standards and Guidelines.)

Attempting to achieve the historic climax plant community ecological sites should direct management actions toward maintaining or restoring the physical function and biological health of the rangeland ecosystem. Sustaining the ecological health and function of rangelands allows the maintenance, enhancement, or creation of future social and economic options. Actions selected must be realistic and physically and economically achievable.

Upland Wildlife Habitat Sub-Objectives

Upland Wildlife Habitat Sub-Objective A: On loamy bottom ecological sites, provide habitat for breeding grasshopper and wintering Baird's sparrows in the Sonoita Basin by maintaining the following:

- An average of 6-8" grass height.
- Ground cover of live grasses and grass litter >75%.
- Less than 10% shrub canopy on two-thirds of the loamy bottom (swales) range sites that are sampled each year.

Upland Wildlife Habitat Sub-Objective B: On open grasslands and in draws in the semidesert grassland and oak savannah vegetation communities (loamy bottom swales, loamy hills, and limy slopes ecological sites) provide the following habitat components for pronghorn antelope fawning at key monitoring sites:

- Maintaining vegetation cover 10-18 inches high during the fawning season from beginning of April through June each year in key fawning areas.
- Maintaining the presence of five or more species of grasses and shrubs in the vegetation communities.
- Limiting trees to no more than 5% of the total cover.
- Maintaining scattered trees greater than 12 feet tall in the habitat.
- Ensuring usable water within 1 mile of key fawning areas.

Riparian Vegetation Objective

Maintain or achieve properly functioning condition (PFC) and the potential natural vegetation community (PNC) (as described below) for 80% of the riparian areas in the Sonoita Valley.

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On BLM lands within the Empire-Cienega Planning Area, the objective is to achieve and maintain PFC on 100% of the riparian areas by 2003 and achieve and maintain PNC (as described below) on 95% of the riparian areas by 2010.

Riparian Potential Natural Community Descriptions:

***Cienegas** (valley bottom streams): Along upper Cienega Creek, achieve and maintain a vegetation community in cienegas with the following conditions:*

- *Ground cover and protective roots > 90% on upper and lower banks*
- *Marsh habitat >50% of the total aquatic habitat in key cienega riparian segments.*
- *Vegetation community on lower banks dominated by rushes, sedges, deer grass, and willows (Juncus, Scirpus, Eleocharis, Carex, Muhleburgia, Salix).*
- *Upper banks and floodplain dominated by sacaton, yerba mansa, cottonwood, willow, and mesquite.*

***Cienegas** (valley bottom ponds): In the historic floodplain of Cienega Creek, achieve and maintain a vegetation community in valley bottom ponds with the following conditions:*

- *Ground cover > 90% on banks.*
- *Emergent vegetation covering 75% or more of the perimeter of the aquatic habitat.*
- *Vegetation community on banks dominated by rushes, sedges, deer grass, and willows (Juncus, Scirpus, Eleocharis, Carex, Muhleburgia, Salix).*
- *Adjacent vegetation dominated by sacaton, paspalum grass, and yerba mansa.*

Note: Dominated means that < 20% in aggregate of the plant community consists of other species (seep willow, Bermuda grass, tamarisk, knot grass, upland herbaceous annuals, or cattail).

***Deciduous woody riparian** (riparian areas with perennial surface water):*
Along lower Cienega Creek (below Mattie Canyon), achieve and maintain the following:

- *A tree community dominated by Goodding willow on lower banks or in aquatic habitat.*
- *Trees on upper banks to include yew willow, Fremont cottonwood, velvet ash, and Arizona black walnut.*
- *A good mix of all age classes of riparian trees.*
- *Lower banks to be dominated by rushes, sedges, seedling riparian trees, and deer grass with bank cover exceeding 90%.*
- *Upper banks to be dominated by deer grass, sacaton grass, and riparian trees of sapling and adult age classes.*

***Deciduous woody riparian** (riparian areas with free subsurface water) Maintain a tree community composed of any of the following tree species according to the existing site's potential: Goodding willow, yew willow, Arizona black walnut, Fremont cottonwood, sycamore, seep willow, alder, box elder, and velvet ash. In addition, lower banks will be dominated by rushes, sedges, seedling riparian trees, and deer grass. If tamarisk is present, it is only a minor component of the riparian tree community.*

Rationale: Properly Functioning Riparian Areas. Riparian health can be defined if the site capability and potential of a given riparian area are generally known (usually by locating and describing relatively pristine reference areas). Departure from this potential shows that the system is at risk of becoming further degraded or dysfunctional.

The riparian objective for BLM-managed lands is consistent with Standard 2 of Arizona Standards and Guidelines for Rangeland Health (Appendix 2). Standard 2 requires that riparian-wetland areas be in properly functioning condition. Proper functioning condition of riparian and wetland areas is determined using the methodology described in the BLM's Riparian Area Management Technical Reference 1737-9, *Process for Assessing Proper Functioning Condition* (BLM 1995). The assessment evaluates presence or absence of the hydrologic, vegetation, and soil erosion/deposition factors that contribute to riparian area function (Appendix 2).

The Cienega Creek riparian system is relatively stable, unlike canyon-bound streams with limited floodplain function. The objective of achieving and maintaining potential natural community for 95% of the riparian areas takes into account disturbances from natural events such as floods or fires which may impact portions of the riparian area, returning them temporarily to an earlier successional stage. Recovery of the riparian area to the potential natural community has been observed to occur fairly rapidly.

Aquatic Habitat Objective

Provide a diversity and high quality of aquatic habitats to maintain and enhance the viability of the existing native fish community and other aquatic species within the Cienega Creek portion of the Sonoita Valley ecosystem by meeting or exceeding values for aquatic habitat parameters shown in Table 2-2 within key segments by 2010 or within 3 years after a major flood.

Table 2-2. Pool Habitat and Cover Requirements for Selected Segments in Cienega Creek

	Minimum Pool features					
Segment Name	**Total Number per mile**	**Number >2' Deep**	**Areal Extent (%)**	**Minimum Instream Cover (ft²/mile)**	**Minimum Overhanging Cover (ft²/mile)**	**Minimum Monthly Flow (cfs)**
Source → Springwater Canyon	70	40	35	10,000	4,000	0.2 June
Springwater Canyon → Coldwater Spring	100	40	50	4,000	4,000	Unknown
Coldwater Spring →Confluence Mattie Canyon	N/A	N/A	80	4,000	4,000	Unknown
Confluence Mattie Canyon Pump Canyon	100	40	50	4,000	4,000	0.7 June
Pump Canyon → Narrows	100	40	50	4,000	4,000	Unknown

Rationale: Lack of pools is often a limiting factor in degraded riparian systems. Excessive sediment loads, coupled with a poor differential in scour and deposition, may prevent or inhibit pool formation and development (Rosgen 1996). The development of a diversity of habitats that creates a wide array of physical attributes is expected to provide habitat for all life stages of each of the three fish species. Some locations along the creek have small areas of floodplain and streambank sheet or gully erosion. Sedimentation is likely to be a continual problem until the stream has adjusted in areas that are recovering from past entrenchment. The major sediment source in these areas is from sloughing banks as a new floodplain is established within the steep walled gully (stream adjustment to release itself from confinement due to entrenchment).

The fish with the most specific habitat requirements is the Gila chub. Overall aquatic habitat diversity and stability are expected to increase if riparian and aquatic parameters listed above are met. Habitat parameters were selected to promote the health of this fish. Since the Gila topminnow and longfin dace also depend on pools and will benefit from the improvement of other parameters, all three fish species are expected to maintain healthy populations.

If the above objective is met, both juveniles and adult life stages of all three species are expected be well represented in this fish community. In addition, all three segments are expected to maintain an average density exceeding 20 chub per 100 ft^2 of deep pool (> 2 ft deep) electrofished. Evidence of three distinct age classes will be interpreted as successful life recruitment into the adult age class. Habitat requirements of the fish have been studied the most thoroughly. But if habitat parameters for fish are met, then other aquatic species are also likely to benefit, including two leopard frog species, Mexican garter snake, Sonoran mud turtle, two species of kingfishers, snipe, and several duck species.

Fish and Wildlife Management Objective

Restore and maintain the native diversity, natural distribution, and abundance of fish and wildlife species in the Sonoita Valley, with sufficient resources and in a manner that perpetuates naturally functioning ecosystem processes by *the following:*

- *Allowing for a mosaic of habitats.*
- *Minimizing habitat fragmentation.*
- *Allowing for waters appropriate to ecosystem capacity.*
- *Minimizing restrictions to movement.*
- *Reestablishing, extending the range of, or supplementing populations.*
- *Implementing recovery plans.*
- *Supporting research efforts.*

Rationale: Achieving the upland and riparian vegetation objectives should produce vegetation states similar to the historic climax communities, creating a mosaic of habitat types for wildlife. Table 2-3 cross-references the rangeland ecological sites in the desired states to wildlife habitats (Brown and Lowe vegetation communities).

Cultural Resources Management Objective

Manage the planning area's cultural resources to realize or protect their scientific information potential, their educational, recreational and traditional values, their usefulness as subjects for experimental studies, and their qualities requiring conservation for the future. To meet this objective the planning area's cultural resources will be allocated among six established use categories:

1. *Scientific Use*
2. *Conservation Use*
3. *Traditional Use*
4. *Public Use*
5. *Experimental Use*
6. *Discharged From Management*

Rationale: Compliance with the National Historic Preservation Act and established BLM policy require management of the planning area's cultural resources in a manner providing for:

1. Collection and assimilation of information about the nature of the cultural resources known and expected to occur within the field area.
2. Assessment of cultural resource use potentials.
3. Assignment of resource uses.
4. Planned steps to protect or realize assigned uses.
5. Authorization of appropriate uses.

(See Appendix 2 for a more detailed description of cultural resource use categories.)

Cultural Resources Sub-Objective

Cultural Resource Sub-Objective A: Empire Ranch Headquarters

Preserve and adaptively reuse the Empire Ranch Headquarters for public benefit without diminishing the historically significant buildings and setting by doing the following:

- *evaluating and nominating structures and buildings for eligibility to the National Register of Historic Places;*

- *stabilizing and maintaining historic structures in accordance with the Secretary of the Interior's Standards and Guidelines for Rehabilitating Historic Buildings on the National Register.*

- *designing and implementing adaptive uses of the headquarters for an array of compatible educational, research, interpretive and administrative programs*

- *continuing the traditional use of the Headquarters to support management of the surrounding lands.*

- *maintaining the Headquarters development and usage at levels compatible with maintaining desired resource conditions for the surrounding lands.*

Recreation Objective

Ensure a range of outdoor recreation opportunities to help meet existing and expected needs while protecting natural resources on all public lands in the Empire-Cienega Planning Area by doing the following:

- *Establishing recreation opportunity zones and management standards that will enhance the spectrum of activities and settings.*

- *Developing and implementing a visitor education program to encourage responsible use of public lands in the Empire-Cienega Planning Area.*

- *Establishing an Empire-Cienega trail system as part of the Sonoita Valley trail system to allow motorized and non-motorized dispersed recreation.*

- *Maintaining and securing legal access to the Empire-Cienega portion of the Sonoita Valley trail system.*

DESCRIPTION OF ALTERNATIVES

The alternatives section in this plan is divided into two parts to differentiate the two levels of BLM planning and decision making which are occurring. The main purposes for this division are (1) to clearly distinguish decisions (land use plan proposals) that would likely require land use plan amendments to change them and (2) to clearly distinguish the land use plan proposals from the activity plan actions because each is subject to different public review and protest/appeal procedures. The Bureau's planning process includes an opportunity for administrative review of Land Use Plans via a plan protest to the BLM State Director following the issuance of the Final Plan. Plan decisions may be appealed following the issuance of the Record of Decision for the Final Plan/EIS. Activity plan actions may also be appealed following the issuance of the decision document.

The first part of the alternatives section includes the four land use plan alternatives for which BLM has proposed decisions at the Resource Management Plan level, including desired conditions, land use allocations, and special designations. Table 2-4 summarizes the changes among the alternatives for the RMP-level proposals.

The second part includes the proposed implementation for each alternative and consists of four integrated activity plans, one for each land use plan alternative. Table 2-5 summarizes the

Table 2-3. Vegetation Communities and Associated Wildlife Species, Empire-Cienega Planning Area

MLRA	**Ecological Site**	**Brown & Lowe Vegetation Community[1]**	**Visual Aspect of the Historic Climax Plant Community**	**Associated Wildlife Species**
41-3 Southern Arizona Semidesert Grassland	1. Sandy Loam Upland; 2. Loamy Upland; 3. Swales; 4. Limy Slopes; 5. Volcanic Hills; 6. Volcanic Hills/Limy Slopes; 7. Loamy Upland-Swales; 8. Sandy Loam Upland/Loamy Upland; 9. Loamy Upland/Limy Slopes	143.1 Semidesert Grassland	open grassland	Baird's sparrow, grasshopper sparrow, scaled quail, aplomado falcon, pronghorn,
	1. Loamy Hills; 2. Loamy Hills/Limy 3. Slopes; 4. Volcanic Hills/Shallow Upland/Clay Hills	143.1	grassland- shrub dotted	Baird's sparrow, grasshopper sparrow, scaled quail, aplomado falcon, lesser long-nosed bat, javelina, pronghorn
	1. Limestone Hills; 2. Basalt	143.1	shrub-grassland	mule deer, javelina,
	1. Limestone Hills/Limy Upland	143.1	shrubland	Gambel's quail, javelina, jaguar
		123.31 Madrean woodland	oak woodland	turkey, Mearn's quail, jaguar, white-tail deer, mule deer,
		altered	mesquite invaded grass	mule deer, javelina, Swainsons hawk
Riparian Plant Communities	Loamy Bottom (Woodland)	223.231 Mesquite Bosque	mesquite woodland	gray hawk (in assoc. with cottonwood willow), white-tail deer, javelina
	Sandy Bottom	243.32 Xero-riparian	savannah	Gambel's quail, Mearn's quail, mule deer, javelina, jaguar
	Loamy Bottom - subirrigated	143.141 Sacaton Grassland	open grassland	Botteri's sparrow, Mearn's quail, black-tailed prairie dog, white-tail deer, javelina

Table 2-3, continued. Vegetation Communities and Associated Wildlife Species, Empire-Cienega Planning Area

MLRA	Ecological Site	Brown & Lowe Vegetation Community[1]	Visual Aspect of the Historic Climax Plant Community	Associated Wildlife Species
	Sandy Bottom - subirrigated	223.211 Southwest Riparian Deciduous Forest	cottonwood- willow forest	fish, lowland and Chiricahua leopard frogs, Mexican garter snake, yellow-billed cuckoo, southwest willow flycatcher, gray hawk, beaver, white-tail deer
	No associated ecological site.	243.321 Southwest Interior Marshland	cienega	fish, lowland and Chiricahua leopard frogs, Mexican garter snake
	loamy bottom		cut mesquite bosque	
	loamy bottom, subirrigated		agricultural field	

[1] Brown (1982)

changes across alternatives for the activity plan proposals. The integrated activity plans incorporate management actions that would have traditionally been found in allotment management plans (AMPs), habitat management plans (HMPs), cultural resource management plans, recreation plans, and area of critical environmental concern (ACEC) management plans.

INTERMIXED LANDS

The presence of intermixed land ownership patterns within the planning area complicates the development and implementation of alternative management strategies. The proposals under each of the alternatives in this plan are intended to apply only to BLM-managed public lands. The exceptions are vegetation treatments and livestock grazing management actions which are also proposed on State Trust Lands on the Empire-Cienega and Empirita allotments since BLM holds the state grazing leases on these allotments. Implementation of these proposals would be coordinated with the Arizona State Land Department.

In some instances proposals, particularly for linear features such as rights-of-ways and road and trail designations, cannot be effectively implemented on public lands without also being implemented on intermixed State Trust Lands. In these instances, the plan determines the need for coordination with the Arizona State Land Department to ensure that necessary rights-of-way or other land authorizations are obtained prior to implementation of the proposal.

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Table 2-4. Comparison of Land Use Plan Alternatives in the Las Cienegas Resource Management Plan

DESIRED RESOURCE CONDITIONS				
Planning Issue	Alternative 1 (current management)	Alternative 2 (proposed)	Alternative 3	Alternative 4
Watershed: Upland, Riparian and Aquatic Management	Manage public lands to achieve and maintain Arizona Standards for Rangeland Health.	In addition, manage public lands to achieve and maintain the goals and desired resource objectives for upland vegetation, riparian vegetation, aquatic habitats developed through the Sonoita Valley Planning Partnership.	Same as Alternative 2.	Same as Alternative 2.
Fish and Wildlife Management	Four T&E species and two candidate species selected for priority management.	Manage public lands to achieve and maintain the goals and desired resource objectives for fish and wildlife developed through the Sonoita Valley Planning Partnership Emphasis on ecosystem approach to management of four rare habitats (grassland, riparian/wetland, mesquite bosque, oak woodland) which support four T&E species, two candidate species, and 11 priority species.	Same as Alternative 2.	Same as Alternative 2.
Visual Resource Management	BLM would designate 49,000 acres as VRM Class III.	BLM would designate 49,000 acres as VRM Class II.	Same as Alternative 2.	Same as Alternative 2.

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Table 2-4, continued. Comparison of Land Use Plan Alternatives in the Las Cienegas Resource Management Plan

DESIRED RESOURCE CONDITIONS, continued				
Planning Issue	Alternative 1 (current management.)	Alternative 2 (proposed)	Alternative 3	Alternative 4
Cultural Resource Management	Manage the historically significant buildings at the Empire Ranch headquarters for Public Use. Manage selected cultural properties outside the ranch headquarters area for scientific and conservation use. As data are collected, some properties and sites could be allocated to public or experimental use, or discharged from management. Work with Native Americans to select harvesting areas for the noncommercial collection of indigenous plants.	Manage public lands to achieve and maintain the goals and desired resource objective for cultural resources developed through the Sonoita Valley Planning Partnership Manage selected cultural properties outside the ranch headquarters area for scientific, conservation, and public use. As data are collected some properties and sites could be allocated to public or experimental use, or discharged from management. Work with Native Americans to select harvesting areas for the noncommercial collection of indigenous plants.	Same as Alternative 2.	Same as Alternative 2.
Recreation Management	No desired recreation opportunity classes established.	Three desired recreation opportunity classes established.	Same as Alternative 2.	Same as Alternative 2.

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Table 2-4, continued. Comparison of Land Use Plan Alternatives in the Las Cienegas Resource Management Plan

LAND USE ALLOCATIONS

Planning Issue	Alternative 1 (current management)	Alternative 2 (proposed)	Alternative 3	Alternative 4
Fish and Wildlife Habitat Management	Manage suitable public land habitats for the recovery or reestablishment of native populations. Reintroduce endangered Gila Topminnow in accord with AGFD-BLM MOU.	Same as Alternative 1 except that reintroductions, range extensions or supplementing federally listed, candidate or other priority species would be pursued in suitable habitats.	Same as Alternative 2.	Same as Alternative 2.
Wildland Fire Management	All natural or human caused wildland fires would be suppressed. Unplanned ignitions would not be managed for resource benefit.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Mining	48,542 acres of public lands remain closed to mineral location and mineral leasing. 458 acres of public lands and 5914.6 acres of split-estate lands remain open to mineral location and mineral leasing. 49,000 acres of public lands and 5914.6 acres of split-estate lands closed to mineral material sales. (Map 2-1)	Same as Alternative 1 except petition to withdraw 458 public domain acres and 5914.6 split-estate acres from mineral location and leasing. (Map 2-4)	41,000 acres of public land and 5914.6 acres of split-estate lands would be open to mineral location and mineral material sales outside of ACEC's. 45,859 acres of public lands and 5914.6 acres of split-estate lands would be open to mineral leasing with the stipulation of no surface occupancy within ACEC's. (Map 2-11)	Same as Alternative 2 (Map 2- 4)
Major Utility Rights-of-Way	BLM would not designate utility corridors.	BLM would designate two utility corridors across public lands in the planning area. (Map 2-5)	BLM would designate three utility corridors across public lands in the planning area. (Map 2-12)	BLM would designate one utility corridor across public lands in the planning area. (Map 2-17)
Off-Highway Vehicle (OHV) Designation	OHV use on 49,000 acres of public land would be limited to designated roads.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.

Table 2-4, continued. Comparison of Land Use Plan Alternatives in the Las Cienegas Resource Management Plan

LAND USE ALLOCATIONS, continued				
Planning Issue	Alternative 1 (current management)	Alternative 2 (proposed)	Alternative 3	Alternative 4
Public Land Road Designations	116.4 miles open - motorized travel 0 miles - seasonal use 20.3 miles - administrative use 0 miles - non-motorized use 2.2 miles - closed and reclaimed (Map 2-2).	93.9 miles open - motorized travel 1.0 miles open - seasonal use 27.0 miles - administrative use 6.6 miles - non-motorized use 16.0 miles - closed and reclaimed (Map 2-6).	94.2 miles open - motorized travel 5.9 miles open - seasonal use 25.4 miles - administrative use 7.6 miles - non-motorized use 11.4 miles - closed and reclaimed (Map 2-13).	86.8 miles open - motorized travel 1.1 miles open - seasonal use 28.5 miles - administrative use 0 miles - non-motorized use 27.6 miles - closed and reclaimed (Map 2-18).
Arizona Trail	BLM would not designate a corridor for the Arizona Trail.	BLM would designate a corridor for the Arizona Trail across 11.6 miles of public lands (Map 2-8).	BLM would designate a corridor for the Arizona Trail. across 14 miles of public land (Map 2- 15).	BLM would designate a corridor for the Arizona Trail across 8 miles of public land (Map 2-20).
Recreation Management	BLM would not designate recreation zones.	BLM would designate 1,109 acres as Recreation Zone 1; 3,504 acres as Recreation Zone 2; and the 44,387 remaining acres as Recreation Zone 3 (Map 2-7).	BLM would designate 1,109 acres as Recreation Zone 1; 16,851 acres as Recreation Zone 2; and the 31,040 remaining acres as Recreation Zone 3 (Map 2-14).	BLM would designate 1,109 acres as Recreation Zone 1; 2,161 acres as Recreation Zone 2; and the 45,730 remaining acres as Recreation Zone 3 (Map 2-19).
Livestock Grazing Management	Authorized on 41,855 public land acres within 4 allotments (Map 2-3).	Authorized on 42,155 public land acres within 5 allotments (Map 2-9).	Authorized on 43,895 public land acres within 5 allotments (Map 2-9).	No public lands would be allocated for livestock grazing.
SPECIAL DESIGNATION AREAS				
ACEC Designation	No ACECs designated.	One ACEC designated on 45,859 acres of public land (Map 2-10).	Two ACECs designated on 4,859 acres of public land (Map 2-16).	Same as Alternative 2 (Map 2-10).
Wild and Scenic Rivers	Manage the Cienega Creek Wild and Scenic Rivers Study Area to protect the resources pending congressional action on designation.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.

Table 2-5. Comparison of Alternatives—Activity Plan Level, Las Cienegas Resource Management Plan

Implementation Issue and Associated Management Actions	Alternative 1 (current management)	Alternative 2 (proposed)	Alternative 3	Alternative 4
Watershed: Upland, Riparian and Aquatic Management continued				
Implement design changes on roads.	Case by case	where degrading watershed or riparian function	Same as Alternative 2.	Same as Alternative 2.
Restrict Livestock grazing in riparian areas to crossing lanes and watering areas.	Partial	Yes	Yes	Yes
Fish and Wildlife Management				
Section 7 consultations	Yes	Yes	Yes	Yes
Implement existing grazing biological opinions's terms and conditions for Gila topminnow, southwestern willow flycatcher, jaguar, lesser long-nosed bat, Huachuca water umbel.	Yes	Yes, these are incorporated as proposed fish and wildlife and livestock grazing management actions.	Same as Alternative 2.	Same as Alternative 2.
Implement Gila topminnow Recovery Plan.	partial	Yes, instream flow application for Cienega Creek, control exotics, establish supplemental populations, minimize creek access and crossings.	Same as Alternative 2.	Same as Alternative 2.

Table 2-5, continued. Comparison of Alternatives—Activity Plan Level, Las Cienegas Resource Management Plan

Implementation Issue and Associated Management Actions	Alternative 1 (current management)	Alternative 2 (proposed)	Alternative 3	Alternative 4
Pursue reintroductions, range extensions or supplementation of priority and special status species into suitable habitats according to established procedures.	For Gila Topminnow only, in accord with existing BLM-AGFD MOU.	Yes	Yes	Yes
Control exotic species	case-by-case	where threaten natives and control is feasible	Same as Alternative 2.	Same as Alternative 2
Complete water source evaluation	partial	Yes	Yes	Yes
Modify fences	case-by-case	Yes (Map 2-24)	Same as Alternative 2.	Same as Alternative 2.
Develop Partnership educational materials on pronghorn	No	Yes	Yes	Yes
Not authorize dog trials in pronghorn habitat from April to June	Yes	Yes (Map 2-25)	Same as Alternative 2.	Same as Alternative 2.
Require dogs to be leashed in pronghorn fawning areas from April to June	No	Yes (Map 2-25)	Same as Alternative 2.	Same as Alternative 2.
Pursue conservation easements or acquisitions of land to maintain movement areas.	No	Yes	Yes	Yes
Develop supplemental waters	case-by-case	Yes, if found necessary from water sources evaluation	Same as Alternative 2.	Same as Alternative 2.

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Table 2-5, continued. Comparison of Alternatives—Activity Plan Level, Las Cienegas Resource Management Plan

Implementation Issue and Associated Management Actions	Alternative 1 (current management)	Alternative 2 (proposed)	Alternative 3	Alternative 4
Cultural Resource Management				
Site Allocation	Empire Ranch Headquarters to public use	Empire Ranch Headquarters to public use	Same as Alternative 2.	Same as Alternative 1.
	no other sites to public use	Matty Canyon, Sandford Homestead, Pump Canyon to scientific use.		
Project Plans	Master Plan for Empire Ranch headquarters would provide for minimal public use and stabilization, but not restoration, of historic buildings.	Master Plan for Empire Ranch headquarters would provide for stabilization, restoration, and adaptive reuse of historic buildings, including historic house museum, interpretive Discovery Trail, and Education on Empire program.	Same as Alternative 2.	Same as Alternative 2.
National Register nominations	Empire Ranch HQ	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Class II Surveys	on 40,000 acres	on 40,000 acres	on 40,000 acres	project-by-project basis
Class III Surveys	along 136.7 miles of roads	along 128.5 miles of roads and trails	along 133.1 miles of roads and trails	along 116.4 miles of roads
Access				
Designated Road System	Yes	Yes	Yes	Yes
Pursue Legal Access	No	Yes (EC-900, EC-901, EC-902, EC-904) (Map 2-26)	Same as Alternative 2.	Same as Alternative 2.

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Table 2-5, continued. Comparison of Alternatives—Activity Plan Level, Las Cienegas Resource Management Plan

Implementation Issue and Associated Management Actions	Alternative 1 (current management)	Alternative 2 (proposed)	Alternative 3	Alternative 4
Road Maintenance	infrequent	Scheduled according to maintenance plan.	Same as Alternative 2.	Same as Alternative 2.
Develop Transportation System Project Plan	No	Yes	Yes	Yes
Livestock Grazing Management				
Maximum livestock numbers on allotment (all land status)	2,064	variable	1,175	1,232
Allowable Utilization	40-60%	30-40%	30-40%	30-40%
Stocking Rate	variable (Empire-Cienega) set (others)	variable	fixed	N/A
Pasture Rotation	selective rest rotation (Empire-Cienega) deferred rotation (others)	selective rest rotation	seasonal use (Vera Earl) deferred rotation (others)	N/A
Proposed Range Improvements	19 range improvements including: 21.5 miles fence 7.25 miles pipeline 4 new wells 3 redeveloped wells 2 corrals (Map 2-22)	Same as Alternative 1. plus riparian exclosures at Narrows and Nogales Springs (Map 2-22)	Same as Alternative 2.	110 miles fence
Biological Planning	Empire-Cienega allotment	all allotments	no allotments	N/A

Table 2-5, continued. Comparison of Alternatives—Activity Plan Level, Las Cienegas Resource Management Plan

Implementation Issue and Associated Management Actions	Alternative 1 (current management)	Alternative 2 (proposed)	Alternative 3	Alternative 4
Recreation Management				
Issue Special Recreation Permits	Case-by-case	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Pursue Special Land Use Permit with Arizona State Land Department	No	Yes	Yes	Yes
Pursue Recreation Permit System.	No	Yes	Yes	Yes
Develop Interpretive Program	No	Yes	Yes	Yes
Develop Maintenance Program	No	Yes	Yes	Yes
Designated Group Sites	0	3 (Map 2-28)	5 (Map 2-29)	1 (Map 2-30)
Designated Camp Areas	0	4 (Map 2-28)	5 (Map 2-29)	4 (Map 2-30)
Day Use Areas	0	2	2	1
Designated Pullouts (minimum#)	0	11	14	10
Group Size (requires special recreation permit[1])	50 vehicles	30 or more people	30 or more people	30 or more people
Mineral Materials				
Defined Administrative Use	No	Yes	Yes	Yes
Defined Casual Use	No	Yes, up to 1 cubic yard.	Same as Alternative 2.	Same as Alternative 2.
Defined Rock Collecting	No	Yes, 25 lbs/day , not to exceed 250 lbs/year.	Same as Alternative 2.	Same as Alternative 2.

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[1] Other conditions may warrant a special recreation permit, including commercial and competitive events.

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THE PROPOSED LAS CIENEGAS NATIONAL CONSERVATION AREA

As BLM was preparing this plan, Arizona Congressman Jim Kolbe introduced into Congress a bill (HR 2941) to designate the majority of the public lands within the Empire-Cienega Planning Area as the Las Cienegas National Conservation Area (NCA). The remaining public lands in the Empire-Cienega Planning Area were proposed for inclusion in the Sonoita Valley Acquisition Planning District. The Las Cienegas National Conservation Area and Sonoita Valley Acquisition Planning District were created when President Clinton signed the bill into law on December 6, 2000. Appendix 1 includes the text of Public Law 106-538.

The law requires BLM to prepare a management plan for the NCA within 2 years of the area's designation. The law acknowledges the effort that went into the preparation of this plan and the collaborative planning process by requiring that BLM prepare the NCA's management plan from a draft of the Empire-Cienega Management Plan and according to the goals and objectives developed by the Sonoita Valley Planning Partnership (SVPP).

This draft Las Cienegas Resource Management Plan has incorporated the draft Empire-Cienega plan. The goals and objectives developed by SVPP are the foundation for this plan and are described in detail in an earlier section of this Chapter. The alternatives in this draft plan are consistent with most of the provisions of the law establishing the Las Cienegas NCA. However, there are a few provisions, such as closing the public lands within the NCA to mineral entry, which are not consistent with one or more of the alternatives in this draft plan. Because of the timing of the law's passage, which occurred when the draft plan was nearly complete, we have not modified the draft plan and EIS to incorporate all provisions of the law. We will make those changes while preparing the final plan and EIS.

PART A. LAND USE PLAN ALTERNATIVES

Alternative 1 - No Action (Current Management)

Alternative 1, the No Action Alternative, would continue current management. Current management has been ongoing under the interim management guidance for the Empire-Cienega Planning Area included in the Phoenix Resource Management Plan (BLM 1988) and the interim grazing plan (BLM 1995). The management goal for the area as stated in the interim management guidance is to "preserve, protect, and enhance the property's multiple use values." "These values include an extensive riparian area, presence of an endangered species, outstanding small and big game habitat, magnificent open space, and potential for dispersed recreation activities such as hiking, horse-back riding, camping, and picnicking." Under current management, desired resource conditions include an emphasis on federally listed threatened and endangered fish and wildlife and significant cultural properties. Land use allocations are limited to continuing the existing livestock grazing leases and continued closure to mineral exploration and development of lands acquired before the enactment of the Federal Land Exchange Facilitation Act of 1988. Alternative 1 would not designate utility corridors, ACECs, recreation zones, or an Arizona Trail corridor. As the baseline against which other alternatives are compared, Alternative 1 is required by the National Environmental Policy Act (NEPA).

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Alternative 1: Land Use Plan Proposals

Desired Resource Conditions

Under Alternative 1, BLM would do the following to meet desired resource conditions:

Fish and Wildlife Management: Give priority management emphasis to four threatened or endangered species (Gila topminnow, southwestern willow flycatcher, lesser long-nosed bat, and Huachuca water umbel), 1 proposed threatened species (Chiricahua leopard frog) and one candidate species (Gila chub).

Visual Resource Management: Designate 49,000 acres of public land as visual resource management (VRM) Class 3. (See Appendix 2-Visual Management Classes for more detail)

Cultural Resource Management: Manage the historically significant buildings at the Empire Ranch Headquarters for Public Use *(Common to All Alternatives).*

Manage selected cultural properties outside the ranch headquarters area for scientific and conservation use. As data is collected some properties and sites could be allocated to public or experimental use or discharged from management.

Work with Native Americans to select harvesting areas for noncommercial collection of indigenous plants *(Common to All Alternatives).*

Recreation Management: Not establish recreation opportunity classes.

Land Use Allocations

Under Alternative 1, BLM would make the following land use allocations:

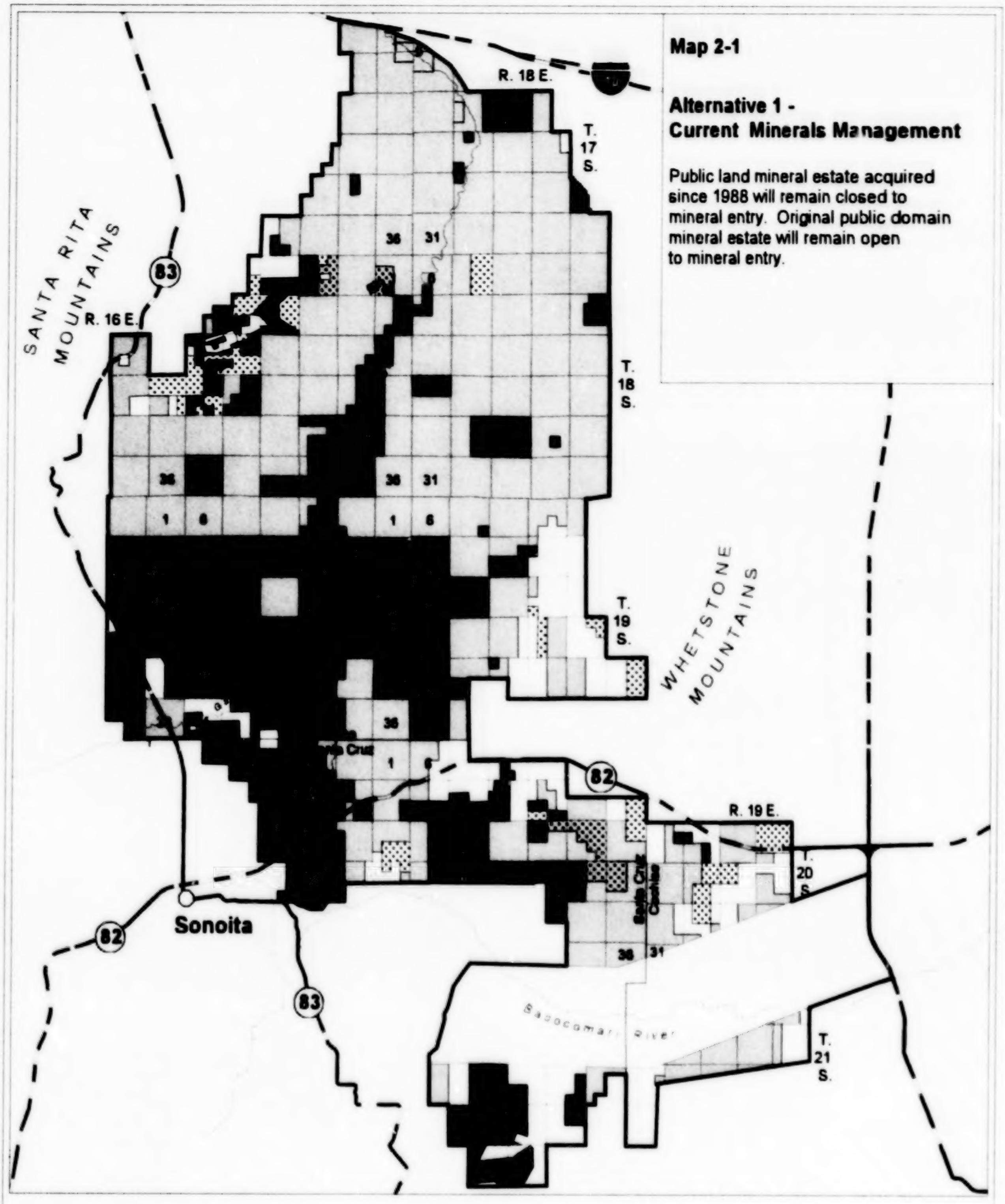
Fish and Wildlife Management: Manage suitable public land habitats for the recovery or reestablishing of native populations in collaboration with federal and state agencies, user groups, and other interested parties. Provide for the reintroduction of Gila topminnow into suitable habitats in accord with the existing BLM-Arizona Game and Fish Department memorandum of understanding.

Wildland Fire Management: BLM will suppress all natural or human-caused wildland fires by first addressing safety concerns to firefighters and the public, and then addressing resource concerns. Because of the planning area's small size, and the proximity of an increasing number of homes in the wildland-urban interface, BLM has determined that it will not manage unplanned ignitions for the benefit of resources *(Proposal Common to All Alternatives).*

Mineral Development: Under Alternative 1, all of the planning area's 48,542 acres of acquired public lands would remain closed to locatable and leasable (fluid) mineral exploration and extraction. The 458 acres in the Empire Mountains–which are original public domain–and the lands with split-estate federal minerals (5,914.6 acres) would remain open to locatable and leasable minerals exploration and extraction. The planning area's 49,000 acres of public lands and 5914.62 acres of spit-estate lands would remain closed to mineral material sales (saleable minerals)(Map 2-1).

Utility Corridors: Not designate utility corridors and continue to process on a case-by-case basis utility rights-of-ways and other land use authorizations.

Off-Highway Vehicle Management: Continue to limit vehicles to the existing road network pending full implementation of a designated road system on 49,000 acres of public land. The existing road system includes 116.4 miles of open roads on public lands. Under current management a few roads are restricted or closed for resource or



Map 2-1

Alternative 1 -
Current Minerals Management

Public land mineral estate acquired since 1988 will remain closed to mineral entry. Original public domain mineral estate will remain open to mineral entry.

DRAFT
LAS CIENEGAS
RESOURCE MANAGEMENT PLAN

N

2 0 2 4 Miles

United States Department of the Interior
BUREAU OF LAND MANAGEMENT
TUCSON FIELD OFFICE

LEGEND

- — Planning Area Boundary
- ■ BLM Land
- ▒ State Land
- ☐ Private Land
- ▥ Federal Minerals, Not Open to Entry
- ░ Federal Minerals, Open to Entry

May 2001

safety reasons, including 20.3 miles of administrative use roads and 2.2 miles of closed roads. (Map 2-2).

Arizona Trail: Not designate a corridor for the Arizona Trail.

Recreation Management: Not establish recreation zones.

Livestock Grazing Management: Continue to authorize livestock grazing on the public lands on the Empire-Cienega, Empirita, Rose Tree, and Vera Earl allotments (Table 2-6) but not allocate acreage for livestock grazing on the 2,480 acres of public lands in the Empire Mountains (Map 2-3).

The Activity Plan Proposal section for Alternative 1 includes detailed narratives of livestock grazing management for each of the planning area's grazing allotments. These narratives discuss grazing strategies, initial allocations, and proposed range improvements.

Special Designation Areas

Under Alternative 1, BLM would do the following:

Areas of Critical Environmental Concern: Not designate additional areas of critical environmental concern.

Wild and Scenic Rivers: Continue to manage the Cienega Creek Wild and Scenic Rivers Study Area to protect the resources pending congressional action on designation *(Common to All Alternatives).*

The Action Alternatives (Alternatives 2, 3, and 4)

The three action alternatives differ from current management in several ways. Under all three, desired resource conditions would include maintaining or achieving goals and objectives for the planning area developed by the Sonoita Valley Planning Partnership. Management under all three alternatives would emphasize the following:

- Conservation of four rare vegetation communities and 18 associated priority species.
- Retention of the scenic values of the landscape.
- Preservation, adaptive restoration, or scientific investigation of significant cultural properties.

The action alternatives propose differing land use allocations for mining, utility corridors, recreation zones, corridors for the Arizona Trail, and grazing. Each would make special designations for areas of critical environmental concern (ACECs).

Alternative 2: Land Use Plan Proposals (Agency Preferred)

Alternative 2 emphasizes ecosystem management and the use of partnerships and collaboration during implementation to achieve desired resource conditions. Biannually, a Biological Planning Team would collaboratively evaluate monitoring data and issues relating to livestock grazing, recreation, and wildlife management for the primary goal of maintaining or achieving desired resource conditions. BLM would designate all public lands within the planning area as an area of critical environmental concern (ACEC) to protect sensitive riparian and wetland habitats. Livestock grazing would continue on public land allotments, but grazing operations would incorporate variable stocking rates and flexible rotations. BLM would designate two utility corridors and a corridor for

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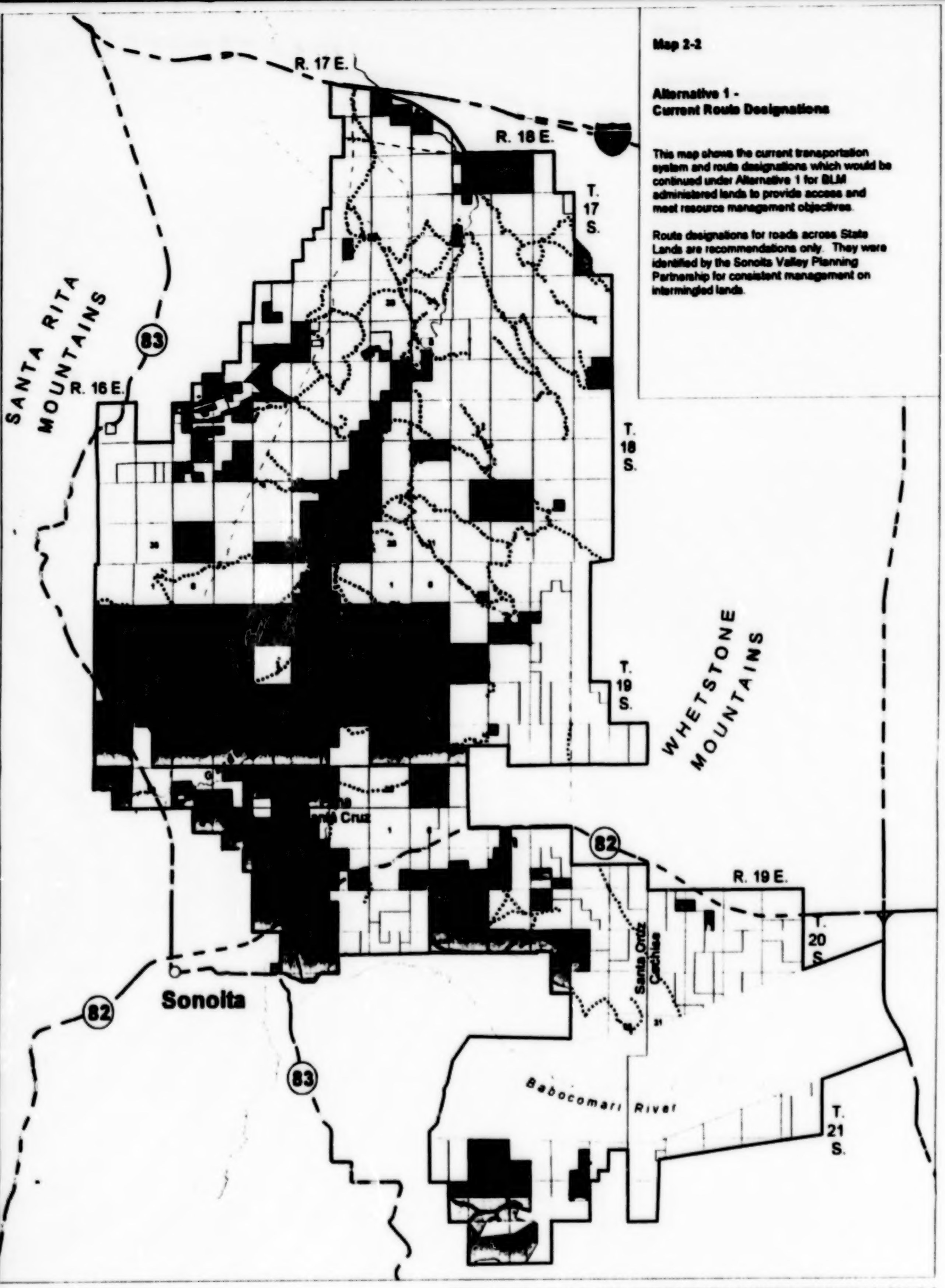

Map 2-2

**Alternative 1 -
Current Route Designations**

This map shows the current transportation system and route designations which would be continued under Alternative 1 for BLM administered lands to provide access and meet resource management objectives.

Route designations for roads across State Lands are recommendations only. They were identified by the Sonoita Valley Planning Partnership for consistent management on intermingled lands.

**DRAFT
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RESOURCE MANAGEMENT PLAN**

N

1 0 1 2 3 Miles

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———	Planning Area Boundary
■	BLM Land
☐	State Land
■	County Land
☐	Private Land

ROUTE DESIGNATION LEGEND

STATE	BLM	
··········	———	Open to All Motorized Travel Year-Round
··········	———	Open to Administrative Motor Vehicle Use Only. Open to Non-Motorized Public Travel Year-Round
··········	———	Closed to All Travel. Obliterate and Revegetate
··········	———	Roads Across Private/Non-Federal Land With No Legal Public Access

May 2001

Table 2-6. Livestock Grazing under Alternative 1, Las Cienegas Resource Management Plan

Allotment	Total Acres	Total Acres Grazed	[redacted]	ASLD Acres Grazed	Private Acres Total
Empire-Cienega (6090)	74,146	73,487	[redacted]	37,462	0
Empirita (6210)	24,988	23,908	[redacted]	23,468	0
Rose Tree (6043)	8,869	8,869	[redacted]	3,719	1200
Vera Earl (6129)	1,440	1,440	[redacted]	0	na
Empire Mountain	3,524	0	[redacted]	0	1,044
TOTAL	**115,923**	**107,704**	[redacted]	**64,649**	**2,244**

[1] An additional 3,141 public land acres on the Appleton-Whittell ACEC are excluded from livestock grazing and not within an allotment. This amount would bring the total public land acres not grazed in the planning area to 7,360.

[2] These 1,080 acres of public land in the Empirita allotment are a more recent land acquisition and have not been allocated for forage, so stocking rates on the allotment have not been adjusted for the increased acreage. Therefore, these acres were not included in the BLM acres grazed column. However, they are not fenced from livestock so at times they may be subjected to livestock grazing.

the Arizona Trail and would close or restrict the use of some roads to provide a mix of motorized and non-motorized recreation while ensuring that desired resource conditions are met. Both mechanized and motorized vehicles would be restricted to designated routes. **This alternative is preferred by participants in the Sonoita Valley Planning Partnership.**

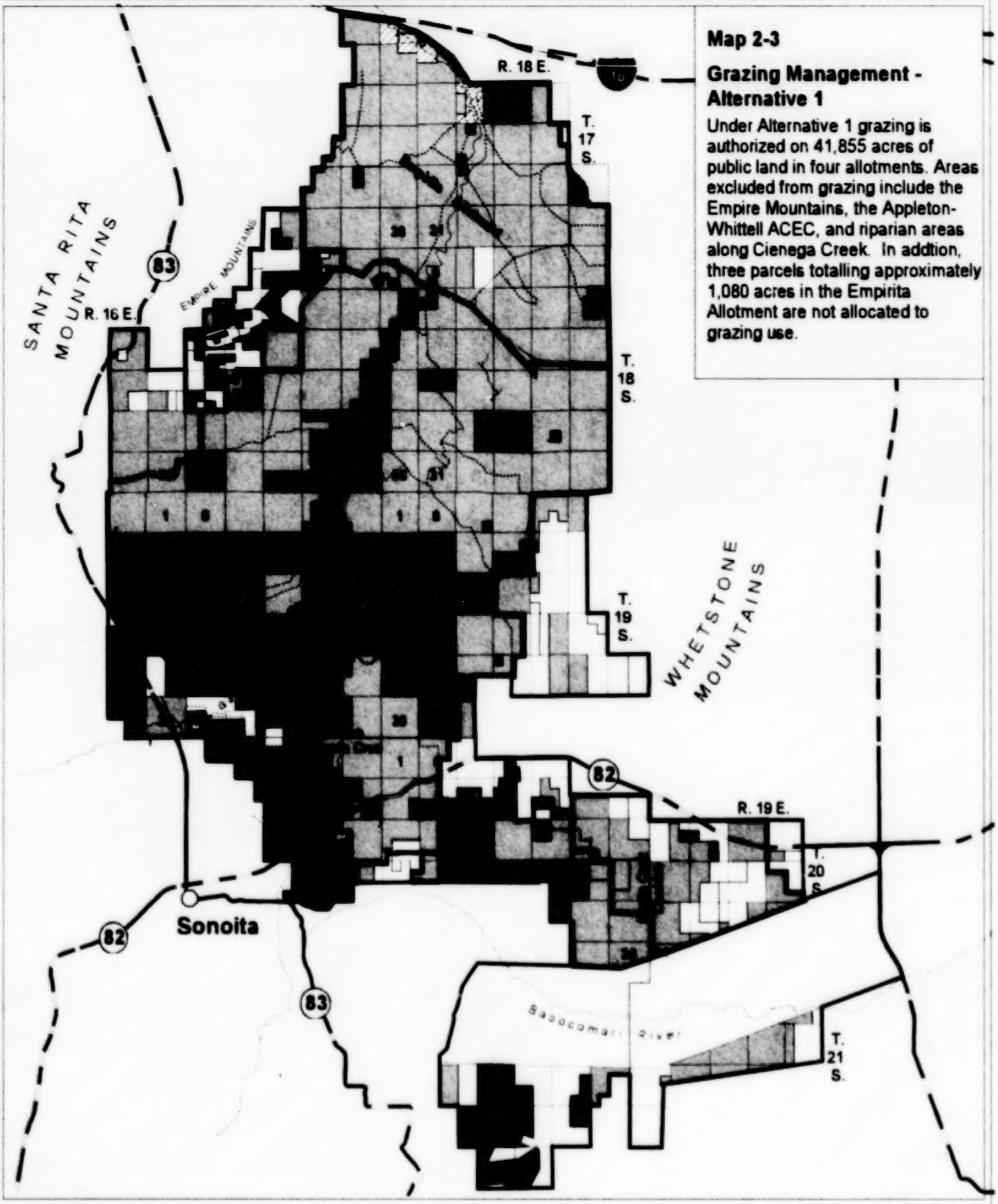
Desired Resource Conditions

Under Alternative 2 (Preferred Alternative), BLM would do the following to meet desired resource conditions:

Watershed: Upland, Riparian and Aquatic Management: Manage public lands to achieve and maintain the goals and desired resource objectives for upland vegetation, riparian vegetation, and aquatic habitats developed through the Sonoita Valley Planning Partnership and described at the beginning of this chapter *(Proposal Common to Alternatives 2, 3, and 4)*.

Fish and Wildlife Management: Manage public lands to achieve and maintain the goals and desired resource objectives for fish and wildlife developed through the Sonoita Valley Planning Partnership and described at the beginning of this chapter *(Proposal Common to Alternatives 2, 3, and 4)*.

Use an ecosystem approach to manage the four rare habitats (grassland, riparian/wetland, mesquite bosque, and oak woodland) that support the following priority species:



Map 2-3

Grazing Management - Alternative 1

Under Alternative 1 grazing is authorized on 41,855 acres of public land in four allotments. Areas excluded from grazing include the Empire Mountains, the Appleton-Whittell ACEC, and riparian areas along Cienega Creek. In addtion, three parcels totalling approximately 1,080 acres in the Empirita Allotment are not allocated to grazing use.

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2 0 2 4 Miles

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LEGEND
— Planning Area Boundary
■ BLM Land
▨ State Land
☐ Private Land
☐ Grazing Allotments
■ Grazing Excluded
— Fences

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Fish
Gila topminnow (T&E)
Gila chub (federal candidate)
longfin dace

Amphibians and Reptiles
lowland leopard frog
Chiricahua leopard frog (federal candidate)
Mexican garter snake

Birds
southwestern willow flycatcher (T&E)
yellow billed cuckoo (key riparian species)
gray hawk (key raptor species)
Baird's sparrow (key grassland sparrow)
Botteri's sparrow (key sacaton species)

Mammals
jaguar (T&E)
lesser long-nosed bat (T&E)
pronghorn (desirable big game and watchable wildlife species)
mule deer (desirable big game species)
white-tailed deer (desirable big game species)
javelina (desirable big game species)

Plants
Huachuca water umbel (T&E)

Visual Resource Management: Designate 49,000 acres of public land as visual resource management (VRM) Class II *(Proposal Common to Alternatives 2, 3, and 4)* (see Appendix 2-Visual Management Classes for more detail).

Cultural Resource Management: Manage public lands to achieve and maintain the goals and desired resource objective for cultural resources developed through the Sonoita Valley Planning Partnership and described at the beginning of this chapter *(Proposal Common to Alternatives 2, 3, and 4).*

Manage the historically significant buildings of the Empire Ranch headquarters for public use *(Common to All Alternatives).*

Manage selected cultural properties outside the ranch headquarters area for scientific, conservation and public use. As data are collected, some properties and sites could be allocated to experimental use or discharged from management.

Work with Native Americans to select harvesting areas for noncommercial collection of indigenous plants *(Common to All Alternatives).*

Recreation Management: Manage public lands to achieve and maintain the goals and desired resource objective for recreation opportunities developed through the Sonoita Valley Planning Partnership and described at the beginning of this chapter *(Proposal Common to Alternatives 2, 3, and 4).*

In accord with the desired recreation goals and objective developed through the Sonoita Valley Planning Partnership and described at the beginning of this chapter, manage public lands to maintain the three recreation opportunity settings (Roaded Natural, Natural, and Back Country) on public lands as described in Table 2-7 *(Proposal Common to Alternatives 2, 3, and 4).* The descriptions for Zones 0 (Rural) and Zone 4 (Primitive) are provided for reference. These zones occur in lands adjacent to the planning area in Sonoita and in the Mount Wrightston Wilderness, respectively.

Land Use Allocations

Under Alternative 2, BLM would make the following land use allocations:

Table 2-7. Desired Recreation Opportunity Settings, Empire-Cienega Planning Area

	Zone 0 - Rural	**Zone 1 - Roaded Natural**	**Zone 2 - Natural**	**Zone 3 - Back Country**	**Zone 4 - Primitive**
Desired Resource Setting	Somewhat natural environment with human changes strongly evident, including residences, businesses, and other structures; paved highways; county roads; improved and unimproved dirt roads; and utility lines and sites. Some visitor impacts to soil and vegetation persist from year to year, typically in areas of moderate to high use, such as campsites, scenic overlooks, and interpretive sites.	Generally natural environment with human modifications moderately evident, including house and other structures at ranch headquarters, improved dirt roads, range developments, and utility lines. Some visitor impacts to soil and vegetation persist from year to year, typically in areas of higher use, such as interpretive sites. Resource changes are evident but harmonious with the natural environment.	Mostly natural environment with low to moderate evidence of human changes, including unimproved and improved dirt roads, range developments, and utility lines. Some visitor impacts to soil and vegetation persist from year to year, typically in areas of moderate use, such as designated camping areas, group sites, and pullouts.	Predominately natural environment of moderate to large size. Human modifications occasionally to somewhat evident, including unimproved dirt roads, range developments, and utility lines. Most visitor impacts to soil and vegetation recover yearly, typically in areas of light and dispersed use such as desirable camping areas and trails.	Predominately natural environment with human modifications rarely to occasionally evident, including unimproved trails; and range developments . Most visitor impacts to soil and vegetation recover annually and are typically found with light use in dispersed recreation concentration areas such as desirable camping areas and trails.
Desired Social Setting	Opportunities for solitude low to moderate. Degree of challenge and risk low to moderate.	Opportunities for solitude low to moderate, degree of challenge and risk low to moderate. Moderate level of interaction among visitors.	Opportunities for solitude moderate to high, degree of challenge and risk low to moderate. Low to moderate level of interaction among visitors.	Opportunities for solitude moderate to excellent, degree of challenge and risk moderate to high. Low level of interaction among visitors but may encounter some evidence of other users.	Opportunities for solitude generally excellent, degree of challenge and risk moderate to high. Low level of interaction among visitors but may find minor evidence of other users.
Desired Managerial Conditions	Focus on maintaining recreation settings that often give users security and convenience.	Focus on maintaining recreation settings that occasionally to often give users security and convenience.	Focus on maintaining recreation settings that rarely to occasionally give users security and convenience.	Focus on maintaining recreation settings that rarely to occasionally give users security and convenience.	Focus on maintaining recreation settings that rarely give users security and convenience. Only subtle if any onsite controls and restrictions.

Table 2-7, continued. Desired Recreation Opportunity Settings, Empire-Cienega Planning Area

	Zone 0 - Rural	**Zone 1 - Roaded Natural**	**Zone 2 - Natural**	**Zone 3 - Back Country**	**Zone 4 - Primitive**
Signing		Occasional, including regulatory, interpretive, directional signs.	Rare to occasional, including regulatory, interpretive, directional signs.	Rare, including regulatory, interpretive, directional signs as needed.	
Typical Road Standard		Improved dirt or gravel with moderate maintenance.	Improved dirt or gravel with occasional maintenance.	Dirt, rarely maintained.	
Degree of User Facilities Developed		Low to Moderate	Low	Very Low to None	
Visitor Information (Type, Level and Location)		formal/informal, moderate, onsite /offsite	informal, low, offsite	informal, low, offsite	

Fish and Wildlife Management: Manage suitable public land habitats for the recovery or reestablishment of native populations in collaboration with federal and state agencies, user groups, and other interested parties. Provide for the reintroduction of Gila topminnow into suitable habitats in accordance with the existing BLM-AGFD Memorandum of Understanding. In addition, provide for the reintroduction, range extension, or supplementation of the following endangered, threatened, candidate and priority species within suitable habitats in accordance with existing regulations, policies and agreements *(Proposal Common to Alternatives 2, 3, and 4)*:

- Gila chub
- Desert pupfish
- Southwestern willow flycatcher
- Aplomado falcon
- Native leopard frogs
- Black-tailed prairie dog
- Beaver
- Pronghorn
- Gould's turkey

Wildland Fire Management: BLM will suppress all natural or human-caused wildland fires by first addressing safety concerns to firefighters and the public, and then addressing resource concerns. Because of the planning area's small size and the proximity of an increasing number of homes in the wildland-urban interface, BLM has determined that it will not manage unplanned ignitions for the benefit of resources *(Proposal Common to All Alternatives)*.

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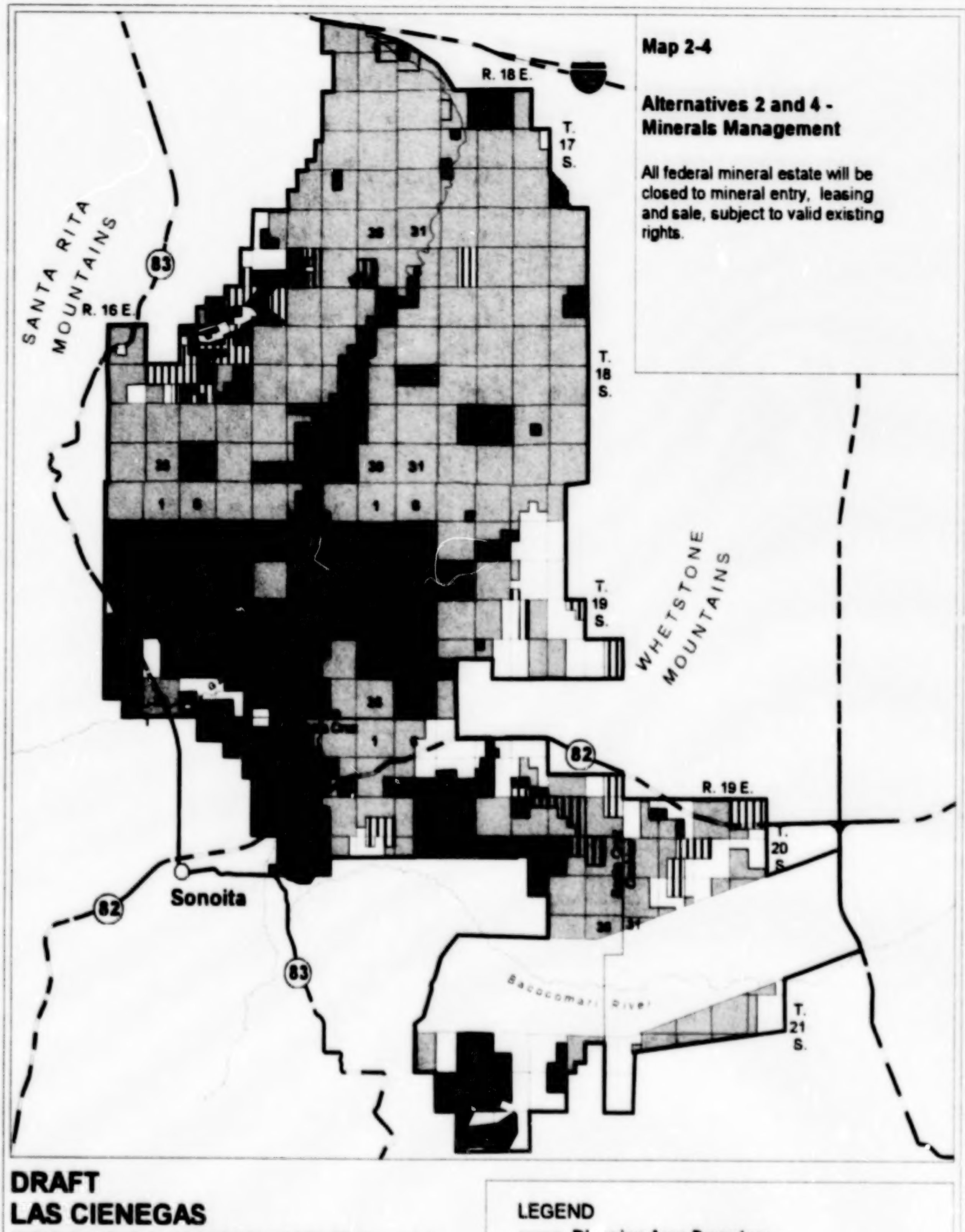

Map 2-4

Alternatives 2 and 4 - Minerals Management

All federal mineral estate will be closed to mineral entry, leasing and sale, subject to valid existing rights.

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2 0 2 4 Miles

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LEGEND

— Planning Area Boundary

■ BLM Land

▨ State Land

☐ Private Land

▥ Federal Minerals, Not Open to Entry

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Mineral Development: Under Alternative 2, the planning area's 48,542 acres of acquired public lands would remain closed to locatable and leasable mineral exploration and extraction (Map 2-4). Public lands acquired in the future within the planning area would be closed to locatable and leasable mineral exploration and extraction. In addition, BLM would take the following actions:

- Petition to withdraw 458 acres of public domain lands in the Empire Mountains.
- Petition to withdraw 4,474.44 acres of federal mineral estate with private surface and 1,440.18 acres of federal mineral estate with state surface from locatable and leasable mineral exploration and extraction.
- Not authorize mineral material sales on public lands in the planning area.

Utility Corridors: Designate two major utility corridors across public lands in the planning area (Map 2-5):

- A 60-foot-wide corridor for buried utility lines running next to the existing El Paso Gas line right-of-way (with an option to tie into and within the existing El Paso easement through a cooperative agreement with El Paso Gas).
- A 1/8-mile-wide corridor for overhead utility lines in the northeast part of the planning area. This corridor already has two overhead utility lines.

All major utilities crossing public lands would be routed through the designated corridors, and BLM would advise utilities to consider east-west routes along corridors proposed by the 1992 Western Regional Corridor Study-Arizona Map. Because of the configuration of the public land corridors and presence of intermixed State Trust Lands, the utility would also need to apply for and obtain a right-of-way from the Arizona State Land Department.

BLM would continue to consider other land use authorizations on a case-by-case basis with stipulations attached to any permits or leases to ensure consistency with the plan's goals and objectives.

Off-Highway Vehicle Management: Limit both motorized and mechanized vehicles to designated roads and trails on the 49,000 acres of public land according to the designated transportation system (Map 2-6)*(Proposal Common to All Alternatives).*

Alternative 2 would make the following road and trail designations:

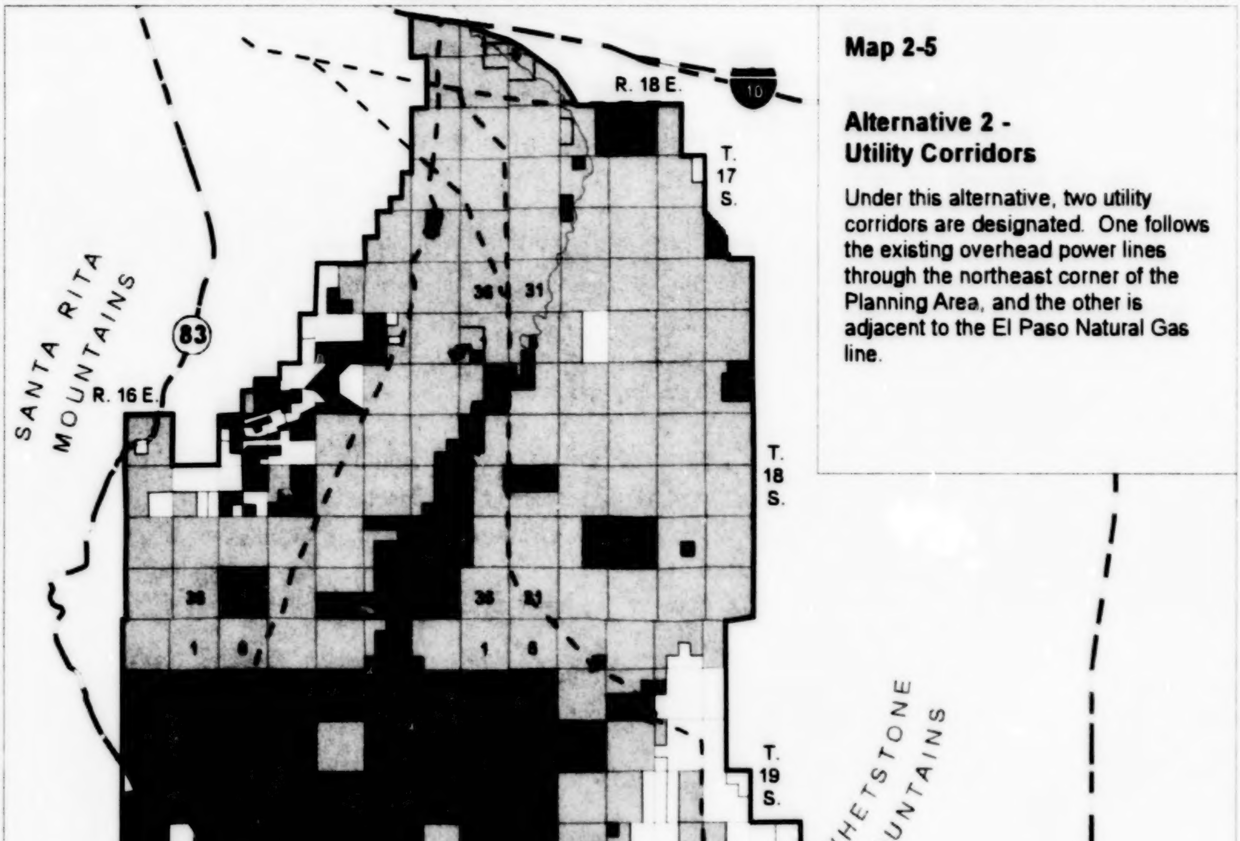
- 93.9 miles would be open for motorized travel by the public.
- 1.0 miles would be open for motorized travel by the public seasonally.
- 27.0 miles would be designated for administrative use only.
- 6.6 miles would be converted to non-motorized trail for travel by mechanized vehicles, horseback or foot.
- 16.0 miles would be closed and rehabilitated.

In addition to the above miles of roads and trails, the designated transportation system will also include the 9.9 miles of non-motorized Arizona Trail (below), an additional 1.5 miles of non-motorized trail proposed by the Southern Arizona Mountain Bike Association (described under recreation management for the Alternative 2 Activity Plan), and the *Heritage Discovery Trail* (a hardened interpretive trail at the Empire Ranch headquarters, which is described under the Cultural Resource Management section of the Alternative 2 Activity Plan).

Map 2-5

Alternative 2 - Utility Corridors

Under this alternative, two utility corridors are designated. One follows the existing overhead power lines through the northeast corner of the Planning Area, and the other is adjacent to the El Paso Natural Gas line.



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LAS CIENEGAS
RESOURCE MANAGEMENT PLAN

2 0 2 4 Miles

N

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LEGEND
- —— Planning Area Boundary
- ■ BLM Land
- ▨ State Land
- □ Private Land
- - - - Existing Utility Right of Way
- ▬ Designated Utility Corridor

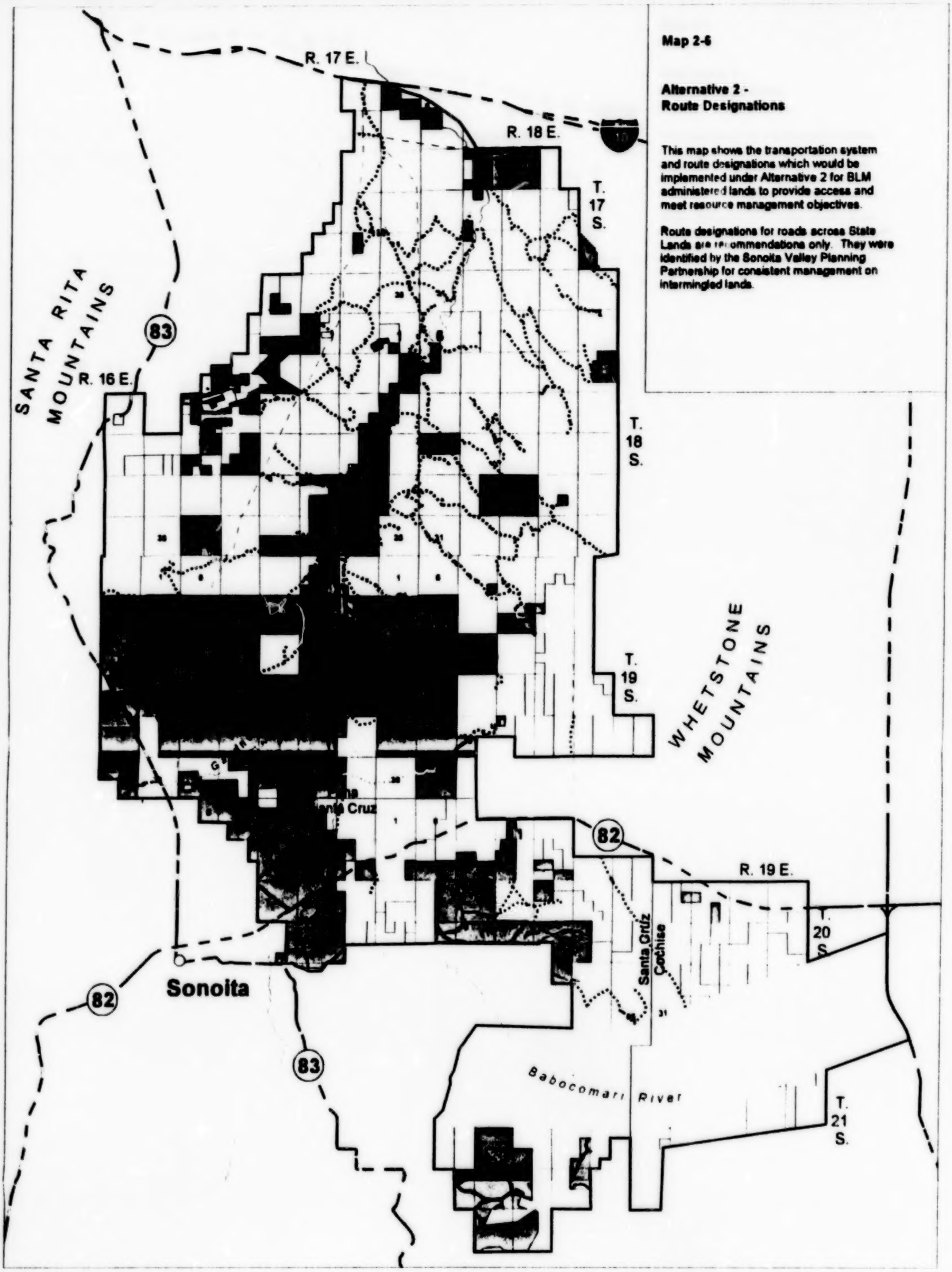
May 2001

Map 2-6

Alternative 2 - Route Designations

This map shows the transportation system and route designations which would be implemented under Alternative 2 for BLM administered lands to provide access and meet resource management objectives.

Route designations for roads across State Lands are recommendations only. They were identified by the Sonoita Valley Planning Partnership for consistent management on intermingled lands.



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LAS CIENEGAS
RESOURCE MANAGEMENT PLAN

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1 0 1 2 3 Miles

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—	Planning Area Boundary
■	BLM Land
■	County Land
☐	State Land
☐	Private Land

ROUTE DESIGNATION LEGEND

STATE	BLM	
·········	━━━	Open to All Motorized Travel Year-Round
· · ·····	·	Open to All Motorized Travel Only from July 1 to March 31
		New Route Construction, Opent to All Motorized Travel Year-Round
·········	━━━	Open to Administrative Motor Vehicle Use Only. Open to Non-Motorized Public Travel Year-Round
·········	━━━	Closed to All Motorized Travel. Maintained Open for Non-Motorized Travel Year-Round
·········	━━━	Closed to All Travel. Obliterate and Revegetate
·········	───	Roads Across Private/Non-Federal Land With No Legal Public Access

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In addition, BLM will recommend to the Arizona State Land Department that similar designations be considered for the segments of these roads that cross intermixed State Trust Lands.

BLM has not secured legal public access to many of the 93.9 miles of roads that cross public lands and are designated as open under this alternative. In the future, other landowners could close some roads or portions of roads to the public. In accordance with existing regulations, BLM might also close roads or portions of roads seasonally, temporarily, or in emergencies where hazard or resource conditions warrant. BLM may also build new road segments to replace existing roads to address resource or management concerns. As described under the activity plan for Alternative 2, BLM would pursue legal public access on four road segments crossing Arizona State Trust Lands.

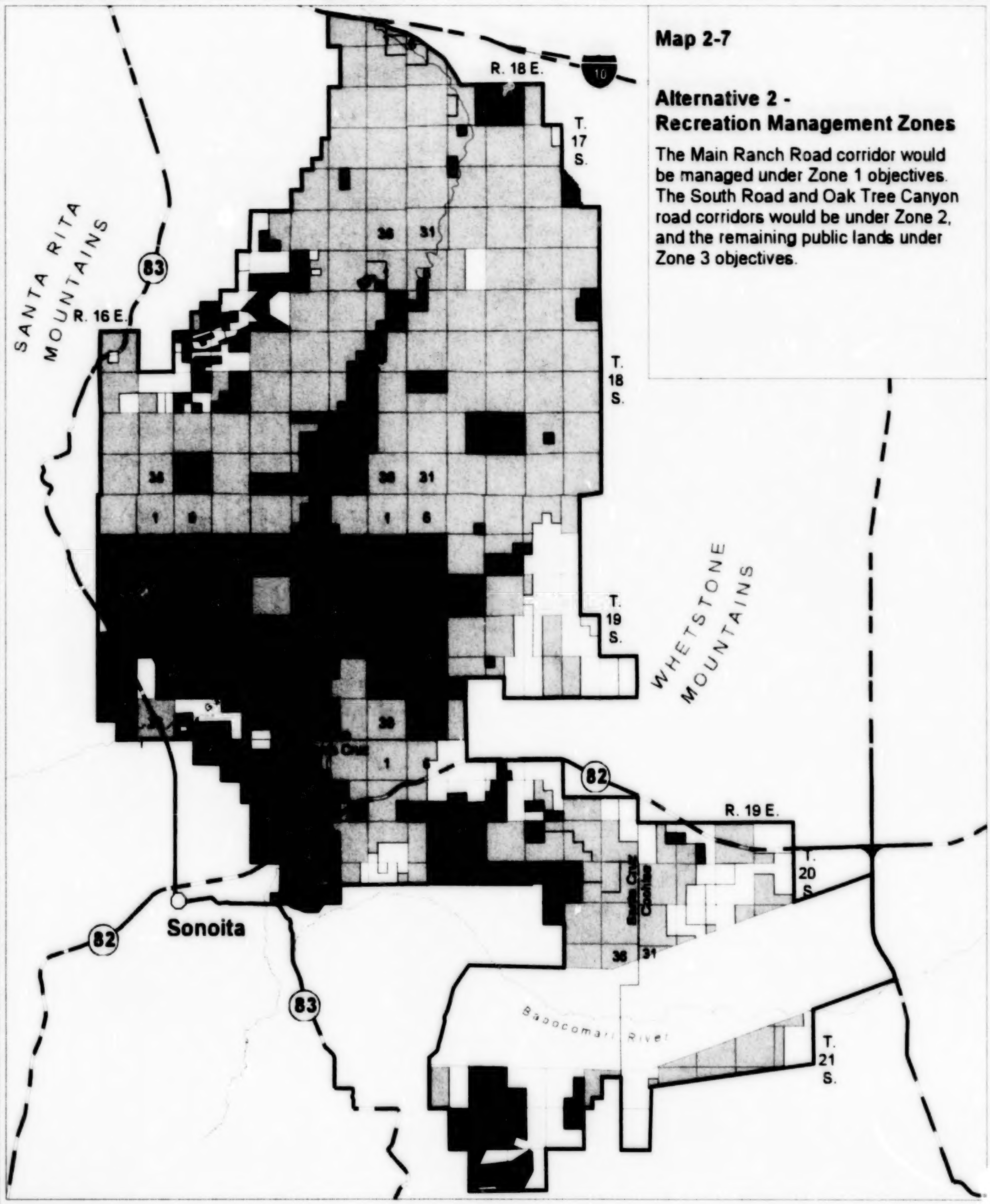
Arizona Trail: Designate a corridor for the Arizona Trail across 11.6 miles of public lands (Map 2-8), determining the exact route after completing site assessments, including cultural resource surveys. The Arizona Trail within this corridor would require 9.3 miles of new trail building across public lands. About 1.7 miles of trail would be shared use on existing roads, and 0.6 miles would be converted from an abandoned road. To have a continuous trail, the corridor would also have to cross State Trust Lands after leaving BLM-administered lands near Wood Canyon. For the trail to cross State Trust Land, a right-of-way must be obtained from the Arizona State Land Department Except for the segment that is shared use, the Arizona Trail will be non-motorized and available for hiking, horseback, or mountain bike use.

Recreation Management: Establish three recreation zones on public lands within the planning area (Map 2-7) *(Proposal Common to Alternatives 2, 3, and 4)*, and manage them to conform to the three recreation opportunity settings described in Table 2-7 (desired resource conditions) and in accord with the desired recreation goals and objective *(Proposal Common to Alternatives 2, 3, and 4)*. The Activity Plan for Alternative 2 describes in more detail recreation management within these zones. The size, location, and configuration of Zone 1 would be the same under Alternatives 2, 3, and 4.

- Zone 1 (Roaded Natural) offers developed, concentrated activities for a wide range of visitor types. It has easy access and visitor, interpretive, and educational facilities. It generally allows day use with no public camping. Motorized traffic is directed to use designated parking, pullouts, and the loop drive. Recreation Zone 1 would consist of a half-mile-wide corridor along the entrance road (from Highway 83 to ranch headquarters). This zone would include the ranch headquarters and Empire Gulch Spring and would encompass 1,109 acres of public land *(Proposal Common to Alternatives 2, 3, and 4)*.

- Zone 2 (Natural) offers moderate access with infrequently maintained roads; concentrated visitor use in designated areas, including camping, parking, pullouts and group sites; and limited visitor facilities and interpretation. Under Alternative 2, Recreation Zone 2 would consist of 3,504 acres of public land, including half-mile-wide corridors along Oak Tree Canyon and South roads.

- Zone 3 (Back Country/Semi-Primitive) offers a low concentration of visitors and a predominately natural environment, variable access that is likely to be difficult, low to no visitor facilities, limited signs, and dispersed low-impact recreational opportunities. Under Alternative 2, Recreation Zone 3 would consist of the remaining 44,387 acres of public lands in the planning area.



Map 2-7

Alternative 2 - Recreation Management Zones

The Main Ranch Road corridor would be managed under Zone 1 objectives. The South Road and Oak Tree Canyon road corridors would be under Zone 2, and the remaining public lands under Zone 3 objectives.

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2 0 2 4 Miles

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LEGEND

— Planning Area Boundary
■ BLM Land
▒ State Land
□ Private Land
■ Zone 1
▨ Zone 2
░ Zone 3

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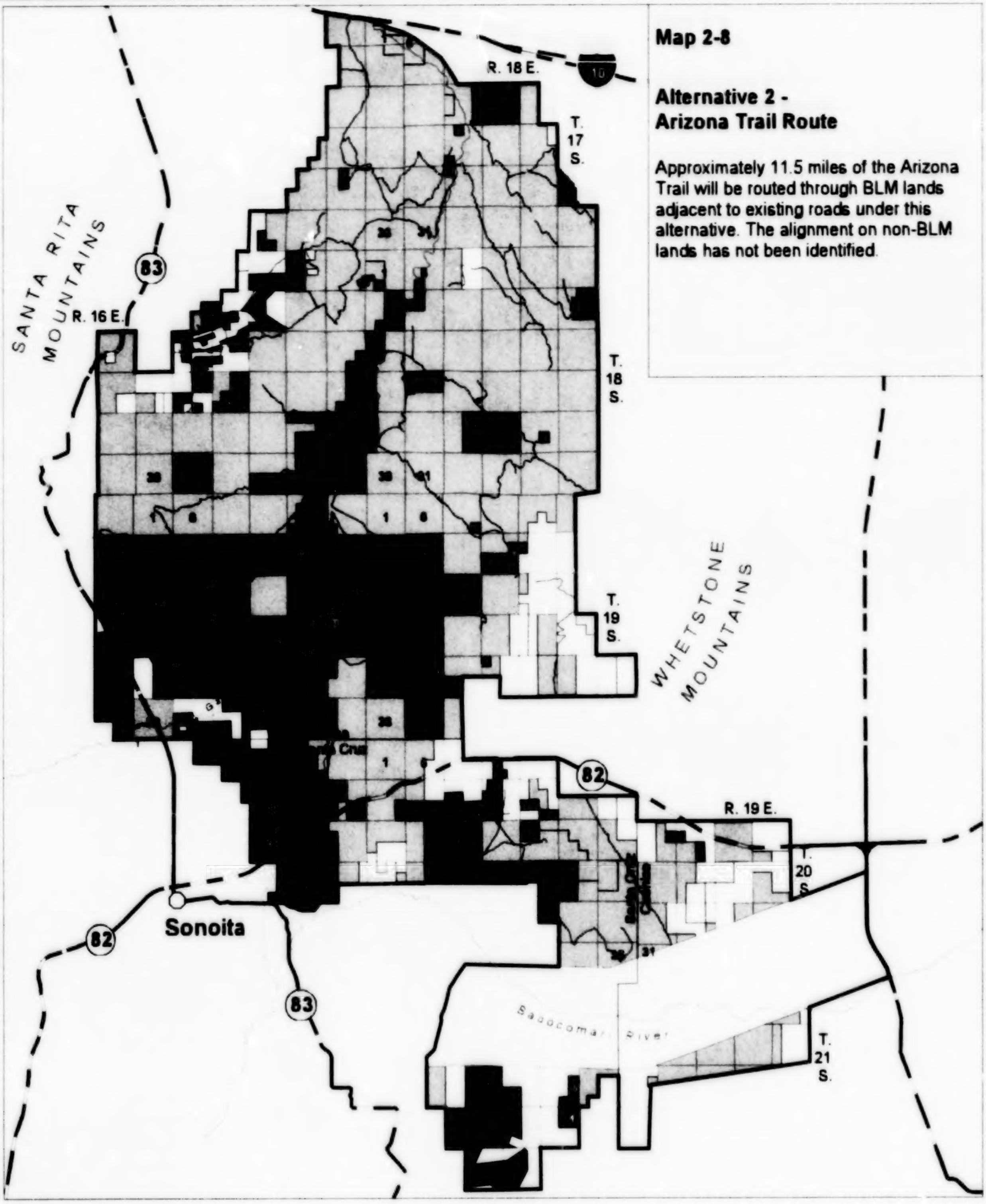
Map 2-8

Alternative 2 - Arizona Trail Route

Approximately 11.5 miles of the Arizona Trail will be routed through BLM lands adjacent to existing roads under this alternative. The alignment on non-BLM lands has not been identified.



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2 0 2 4 Miles

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LEGEND

— Planning Area Boundary

■ BLM Land

▨ State Land

☐ Private Land

— Existing Road

▬ Arizona Trail Route

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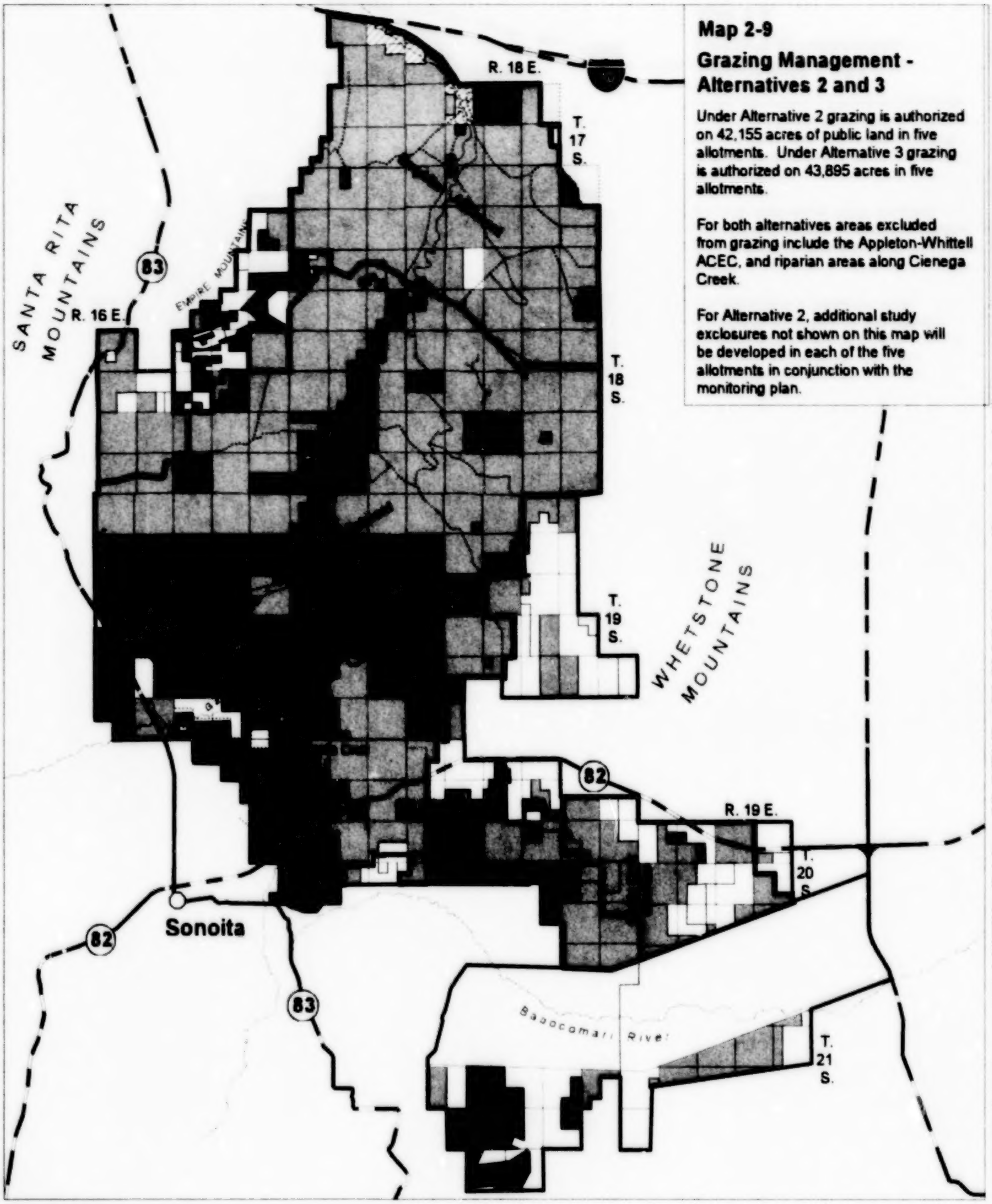
Map 2-9

Grazing Management - Alternatives 2 and 3

Under Alternative 2 grazing is authorized on 42,155 acres of public land in five allotments. Under Alternative 3 grazing is authorized on 43,895 acres in five allotments.

For both alternatives areas excluded from grazing include the Appleton-Whittell ACEC, and riparian areas along Cienega Creek.

For Alternative 2, additional study exclosures not shown on this map will be developed in each of the five allotments in conjunction with the monitoring plan.



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LAS CIENEGAS
RESOURCE MANAGEMENT PLAN

2 0 2 4 Miles

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LEGEND
- Planning Area Boundary
- ■ BLM Land
- ▨ State Land
- ☐ Private Land
- Grazing Allotments
- ■ Grazing Excluded
- Fences

May 2001

Table 2-8. Livestock Grazing under Alternative 2, Las Cienegas Resource Management Plan

Allotment	**Total Acres**	**Total Acres Grazed**	[redacted]	**ASLD Acres**	**Private Acres**
Empire-Cienega (6090)	74,146	71,827	[redacted]	37,462	0
Empirita (6210)	24,988	24,468	[redacted]	23,468	0
Rose Tree (6043)	8,869	8,469	[redacted]	3,719	1,200
Vera Earl (6129)	1,440	1,240	[redacted]	0	na
Empire Mountains	3,524	3,044	[redacted]	0	1,044
TOTAL	**115,923**	**109,048**	[redacted]	**64,649**	**2,244**

[1] An additional 3,141 public land acres in the Appleton-Whittell ACEC are excluded from livestock grazing and are not within an allotment, bringing to 7,060 the total public land acres excluded from livestock grazing.

Livestock Grazing Management: Allocate forage for livestock grazing on 42,155 acres of public land and continue to authorize livestock grazing on the Empire-Cienega, Empirita, Rose Tree, and Vera Earl allotments (Table 2-8). BLM would also allocate acreage for livestock grazing on the 2,480 acres of public lands in the Empire Mountains. (Map 2-9). But BLM would authorize grazing use in riparian pastures and exclosures only to meet resource objectives. For each of these allotments the Activity Plan for Alternative 2 has detailed narratives of livestock grazing management, including grazing strategies, initial allocations, and proposed range improvements.

Special Designation Areas

Under Alternative 2, BLM would make the following special designations:

Areas of Critical Environmental Concern: Designate the Empire-Cienega Area of Critical Environmental Concern (ACEC) on 45,859 acres of public lands within the planning area (Map 2-10). This ACEC would include all of the planning area's public lands except for the 3,141 acres of public lands now within the Appleton-Whittell ACEC (Research Ranch), which would remain as a separate ACEC and be renamed the Appleton-Whittell Research ACEC.

Any State Trust and private lands acquired in the future within ACEC boundaries would be incorporated into the ACEC(s) and managed according to the prescriptions of this plan.

The Activity Plan for Alternative 2 would be the proposed management plan for the Empire-Cienega ACEC, including all management proposals common to Alternatives 2, 3, and 4 and all proposals specific to Alternative 2. (See Appendix 2 for full descriptions of the ACECs, including management prescriptions. Appendix 2

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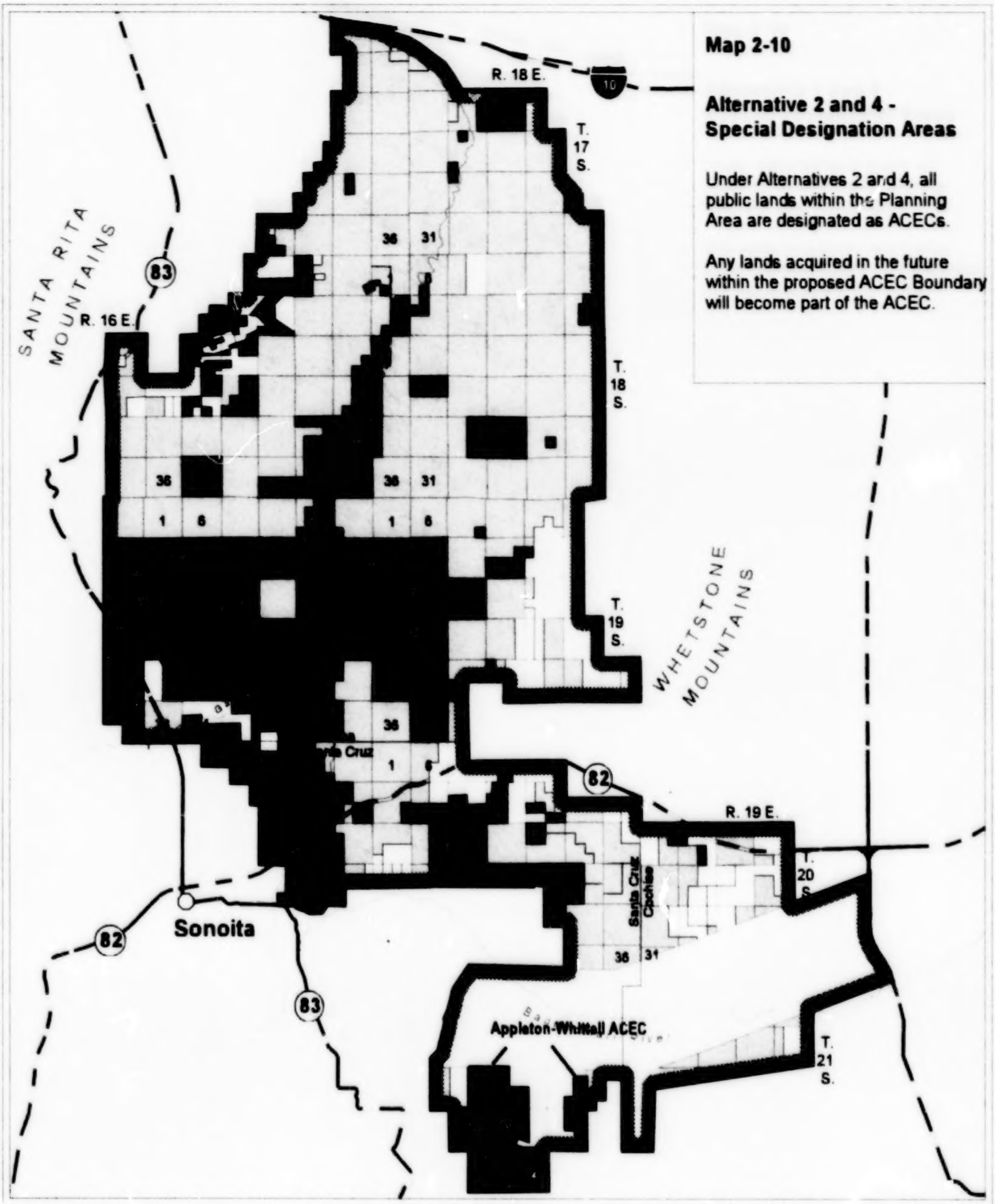

Map 2-10

Alternative 2 and 4 - Special Designation Areas

Under Alternatives 2 and 4, all public lands within the Planning Area are designated as ACECs.

Any lands acquired in the future within the proposed ACEC Boundary will become part of the ACEC.

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RESOURCE MANAGEMENT PLAN

2 0 2 4 Miles

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LEGEND

— Planning Area Boundary
■ BLM Land
□ State Land
□ Private Land
▨ Proposed ACEC
■ Existing ACEC
▬ Proposed ACEC Boundary

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Table 2-9. Summary of Management Within Areas of Critical Environmental Concern (ACECs) under Alternatives 2, 3, and 4, Las Cienegas Resource Management Plan

	Alternative 2	Alternative 3	Alternative 4
Watershed and Riparian Area Management			
Require permits for collecting and harvesting plant materials in any amounts.	Yes	Yes[1]	Yes
Limit development on the 100-year floodplain of Cienega Creek to that needed to reduce impacts on riparian and aquatic areas.	Yes	Yes	Yes
Restrict activities found to degrade streambank stability and decrease bank stability rating to below 90%.	Yes	Yes	Yes
Rights-of-Way Management			
Restrict major utility rights-of-way to designated corridors.	Yes	Yes[1]	Yes
Minerals Management			
Keep acquired public lands closed to locatable and leasable mineral extraction. Subject to valid existing rights, withdraw public domain lands to locatable and leasable mineral entry. Do not authorize mineral material sales.	Yes	locatable only. NSO for leasable in ACEC[2]	Yes
Require free use permits for removing mineral materials for personal use.	Yes	Yes[1]	Yes
Prohibit recreational gold panning, dredging, or sluicing within Cienega Creek or its tributaries on public lands.	Yes	Yes	Yes
Livestock Grazing Management			
Base livestock numbers on resource conditions and set them through the biological planning process.	Yes	No	NA
Limit livestock use in riparian areas of Cienega Creek and Nogales Springs to crossing lanes, watering areas, and areas where livestock grazing is needed as a management tool to meet a riparian or aquatic-related resource objective.	Yes	Yes	NA
Adjust livestock grazing rotation and use levels and develop fencing as needed to meet cover requirements for antelope fawning and grassland sparrows.	Yes	Yes[3]	NA
Recreation Management			
Limit motorized vehicles to designated roads on 49,000 acres of public land.	Yes	Yes[1]	Yes
Allow motorized and non-motorized permitted group activities to cross Cienega Creek only at dry crossings or designated road and trail crossings.	Yes	Yes	Yes
Prohibit camping in riparian areas within 100 feet of the water's edge on each side of the stream.	Yes	Yes	Yes
Do not authorize dog trials and require that dogs be leashed In important pronghorn fawning areas during the fawning season (April-June).	Yes	Yes[3]	Yes

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Table 2-9, continued. Summary of Management Within Areas of Critical Environmental Concern (ACECs) under Alternatives 2, 3, and 4, Las Cienegas Resource Management Plan

	Alternative 2	Alternative 3	Alternative 4
Place travel restrictions (administrative or seasonal use) or closures on roads which are impacting sensitive resources.	Yes 44.0 miles	Yes[1] 42.7 miles	Yes 57.2 miles
Keep public lands in Recreation Zone 3 open to dispersed camping. Restrict camping on public lands in recreation Zone 2 to designated areas. Close public lands in Recreation Zone 1 to camping.	Yes	Yes[3]	Yes

---

[1] For Alternative 3 this restriction would apply to all public lands in the planning area, not just lands within ACECs.

[2] For Alternative 3 ACECs would be closed to locatable mining. Leasable minerals could be extracted, but drilling could not involve surface occupancy. NSO = no surface occupancy (NSO).

[3] For Alternative 3 this restriction would apply to all public lands in the planning area, but the ACEC would have no lands designated Recreation Zone 1 or 2, or pronghorn or grassland sparrow habitat.

also describes management for the Appleton-Whittell Research ACEC as prescribed in the Phoenix RMP (BLM 1988). Table 2-9 summarizes the management prescriptions that would apply to the Empire-Cienega ACEC under Alternative 2 and compares these restrictions to those for ACEC management under Alternatives 3 and 4.

Wild and Scenic Rivers: Continue to manage the Cienega Creek Wild and Scenic Rivers Study Area to protect resources pending congressional action on designation *(Proposal Common to All Alternatives).*

Alternative 3: Land Use Plan Proposals

Alternative 3 proposes allowing the greatest mix of land uses with restrictions to protect sensitive areas. It would designate two ACECs to protect sensitive riparian and wetland habitats. Outside the ACECs, public lands would be opened to mining, oil and gas leasing, and mineral sales. Livestock grazing would continue on public land allotments, but current livestock grazing operations would be modified by reducing livestock numbers to conservative fixed stocking rates and establishing structured pasture rotations rather than variable stocking rates, seasonal use, and flexible rotations. BLM would designate three utility corridors and a corridor for the Arizona Trail. Alternative 3 proposes fewer road closures and restrictions than do Alternatives 2 and 4 with emphasis on a mix of motorized and non-motorized recreation opportunities. Alternative 3 would also limit camping to designated sites on the most acreage.

Desired Resource Conditions

Under Alternative 3 BLM would do the following to meet desired resource conditions:

Watershed: Upland, Riparian and Aquatic Management: Apply management to meet and maintain the goals and objectives (desired future conditions) for upland vegetation, riparian vegetation and aquatic habitats as described for Alternative 2 *(Proposal Common to Alternatives 2,3, and 4).*

Fish and Wildlife Management: Apply management to meet and maintain the goals and objectives (desired future conditions) for fish and wildlife and place management emphasis on the four rare habitats that support 18 priority species as described for Alternative 2 *(Proposal Common to Alternatives 2,3, and 4).*

Visual Resource Management: Designate 49,000 acres of public land as visual resource management (VRM) Class II (see Appendix 2-Visual Management Classes for more detail) *(Proposal Common to Alternatives 2,3, and 4).*

Cultural Resource Management: Under Alternative 3, management of cultural resources in the planning area would be the same as under Alternative 2.

Recreation Management: Manage to maintain three recreation opportunity settings on public lands as described for Alternative 2 *(Proposal Common to Alternatives 2, 3, and 4).*

Land Use Allocations

Under Alternative 3, BLM would make the following land use allocations:

Fish and Wildlife Management: Manage suitable public land habitats for the recovery or reestablishing of native populations in collaboration with federal and state agencies, user groups and other interested parties. Provide for reintroducing Gila topminnow into suitable habitats in accord with the existing BLM-AGFD Memorandum of Understanding. In addition, provide for reintroducing the following endangered, threatened, candidate, and priority species in accord with existing regulations, policies, and agreements *(Proposal Common to Alternatives 2, 3, and 4):*

- Gila chub
- Desert pupfish
- Southwestern willow flycatcher
- Aplomado falcon
- Native leopard frogs
- Black-tailed prairie dog
- Beaver
- Pronghorn
- Gould's turkey

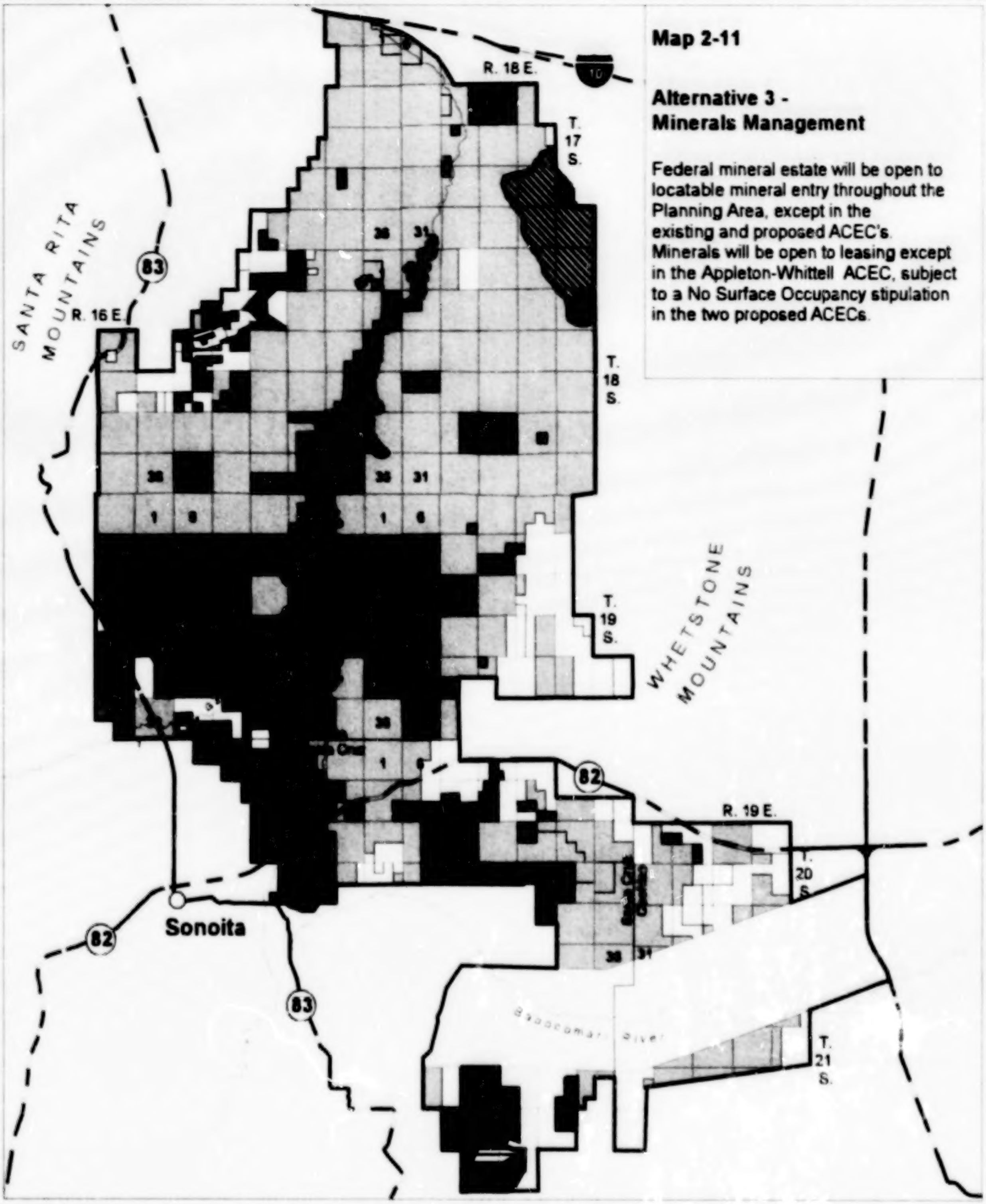
Wildland Fire Management: BLM will suppress all natural or human-caused wildland fires by first addressing safety concerns to firefighters and the public, and then addressing resource concerns. Because of the planning area's small size, and the proximity of an increasing number of homes in the wildland-urban interface, BLM has determined that it will not manage unplanned ignitions for the benefit of resources *(Proposal Common to All Alternatives).*

Mineral Development: Outside of ACECs, open 41,000 acres of acquired lands to locatable mineral exploration and extraction and open future acquired public lands in the planning area to locatable mineral exploration and extraction under the General Mining Law subject to the 43 CFR 3809 and 43 CFR 3715 regulations (Map 2-11). In addition, BLM would open 45,859 acres of public lands to mineral leasing (fluid minerals) subject to standard lease terms and conditions and stipulations. BLM would allow no surface occupancy in any ACECs, nor would BLM authorize mineral material sales. On the rest of the public lands BLM would consider mineral materials sales on a case-by-case basis. The Appleton-Whittell ACEC will remain closed to mineral entry and leasing.

Utility Corridors: Designate three major utility corridors across public lands in the planning area (Map 2-12):

- A 60-foot wide corridor for buried utility lines running next to the existing El Paso Gas line right-of-way (with an option to tie into and within the existing El Paso easement through a cooperative agreement with El Paso Gas).

- A 1/8-mile-wide corridor for overhead utility lines. This corridor now has two overhead utility lines in the northeast part of the planning area.



Map 2-11

Alternative 3 - Minerals Management

Federal mineral estate will be open to locatable mineral entry throughout the Planning Area, except in the existing and proposed ACEC's. Minerals will be open to leasing except in the Appleton-Whittell ACEC, subject to a No Surface Occupancy stipulation in the two proposed ACECs.

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RESOURCE MANAGEMENT PLAN

N

2 0 2 4 Miles

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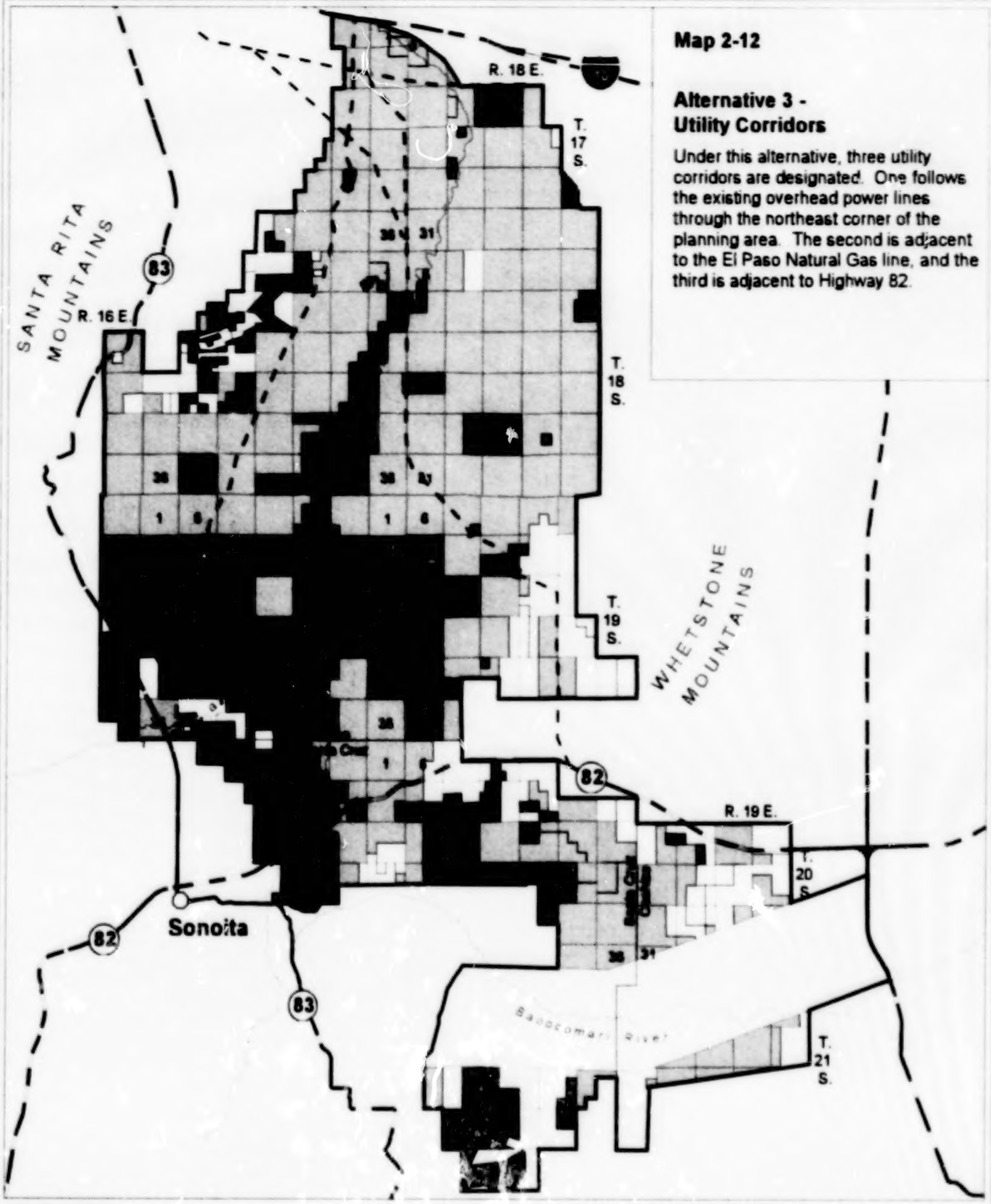
LEGEND
— Planning Area Boundary
■ BLM Land
▨ State Land
☐ Private Land
☰ Closed to Mineral Entry and Leasing
▧ Closed to Mineral Entry, Open to Leasing with NSO Stipulation

May 2001



Map 2-12

Alternative 3 - Utility Corridors

Under this alternative, three utility corridors are designated. One follows the existing overhead power lines through the northeast corner of the planning area. The second is adjacent to the El Paso Natural Gas line, and the third is adjacent to Highway 82.

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N

2 0 2 4 Miles

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LEGEND
— Planning Area Boundary
■ BLM Land
▨ State Land
☐ Private Land
- - - Existing Utility Right of Way
▬ Designated Utility Corridor

May 2001

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ENVIRONMENTAL IMPACT STATEMENT... DRAFT...
U.S. DEPARTMENT OF THE INTERIOR...
AUGUST 2001

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SUPTDOCS/GPO
P.0087-0176

- A 50-foot-wide corridor for buried utility lines along State Highway 82 between Sonoita and the Cochise County line next to the Arizona Department of Transportation right-of-way.

All major utilities crossing public lands would be routed through the designated corridors, and BLM would also advise utilities to consider east-west routes along corridors proposed by the 1992 Western Regional Corridor Study-Arizona Map. Because of the configuration of the public land corridors and presence of intermixed State Trust Lands, the utility would also need to apply for and obtain a right-of-way from the Arizona State Land Department.

BLM would continue to consider other land use authorizations on a case-by-case basis with stipulations to any permits or leases to ensure consistency with the plan.

Off-Highway Vehicle Management: Limit motorized (but not mechanized) vehicles to designated roads and trails on the 49,000 acres of public land according to the designated transportation system (Map 2-13) *(Proposal Common to All Alternatives).*

Under Alternative 3, BLM would make the following route designations on public lands:

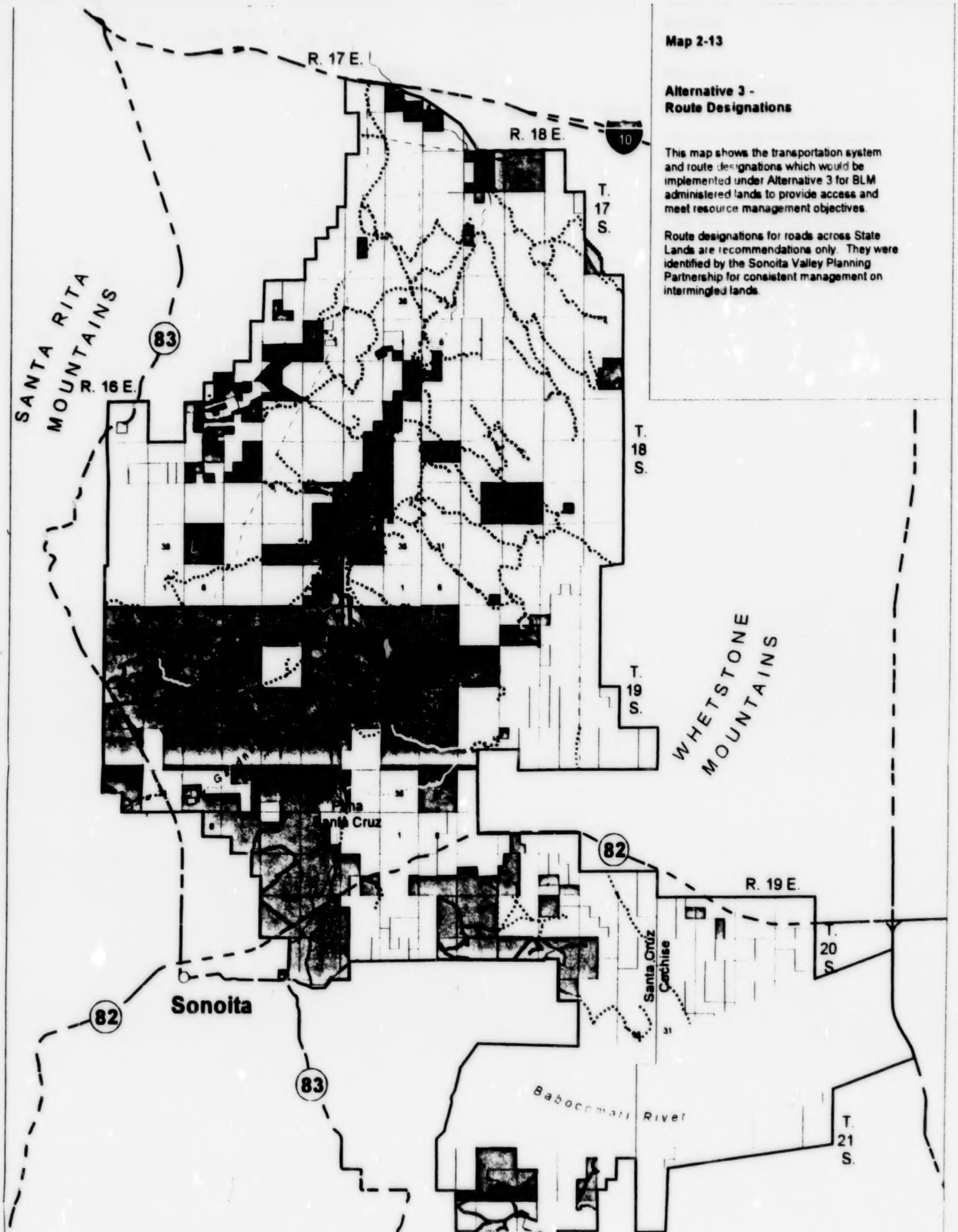
- 94.2 miles open to public motorized travel.
- 5.9 miles seasonally open to public motorized travel.
- 25.4 miles designated for administrative use only.
- 7.6 miles converted to non-motorized trail for travel by mechanized vehicles, horses, and foot.
- 11.4 miles closed and rehabilitated.

In addition to the above miles of roads and trails, the designated transportation system will also include the 11.2 miles of non-motorized Arizona Trail (below) and the *Heritage Discovery Trail* (a hardened interpretive trail at the Empire Ranch headquarters which is described under the Cultural Resource Management section of the Alternative 2 Activity Plan).

In addition, BLM will recommend to the Arizona State Land Department that similar designations be considered for the segments of these roads that cross intermixed State Trust Lands.

BLM has not secured legal public access to many of the 94.2 miles of public land roads that this alternative would designate as open. In the future other landowners may close access to some roads or portions of roads. In addition, BLM may seasonally, temporarily, or in an emergency close roads or portions of roads where hazard or resource conditions warrant. BLM may also build new road segments to replace existing roads in response to resource or management concerns. As described under the activity plan for Alternative 3, BLM would pursue legal public access on four road segments crossing Arizona State Trust Lands.

Arizona Trail: Designate a corridor for the Arizona Trail across 14 miles of public land (Map 2-15) and determine the trail's exact route within this corridor after completing site assessments, including cultural resource surveys. For the trail to pass within this corridor, 11.2 miles of new trail would need to be built across public lands. The remaining 2.8 miles would consist of shared use on existing roads. To have a continuous trail, the corridor would also have to be routed across 1 mile of intermingled State Trust Lands. For the trail to cross State Trust Land, a right-of-way must be obtained from the Arizona State Land Department. Except for the segment that is shared use, The Arizona Trail will be non-motorized and open to hiking, horseback, or mountain bike use.



Map 2-13

Alternative 3 - Route Designations

This map shows the transportation system and route designations which would be implemented under Alternative 3 for BLM administered lands to provide access and meet resource management objectives.

Route designations for roads across State Lands are recommendations only. They were identified by the Sonoita Valley Planning Partnership for consistent management on intermingled lands.

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LAS CIENEGAS
RESOURCE MANAGEMENT PLAN

N

1 0 1 2 3 Miles

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TUCSON FIELD OFFICE

ROUTE DESIGNATION LEGEND

STATE	BLM	
·········	———	Open to All Motorized Travel Year-Round
		Open to All Motorized Travel Only from July 1 to March 31
		New Route Construction, Opent to All Motorized Travel Year-Round
·········	———	Open to Administrative Motor Vehicle Use Only. Open to Non-Motorized Public Travel Year-Round
·········	———	Closed to All Motorized Travel. Maintained Open for Non-Motorized Travel Year-Round
·········	———	Closed to All Travel. Obliterate and Revegetate
·········	———	Roads Across Private/Non-Federal Land With No Legal Public Access

——— Planning Area Boundary

■ BLM Land	■ County Land
□ State Land	□ Private Land

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Recreation Management: Establish three recreation zones on public lands within the planning area (Map 2-14) and manage them to conform to the three recreation opportunity settings described in Table 2-7 (desired resource conditions) and in accord with the desired recreation goals and objective *(Proposal Common to Alternatives 2, 3, and 4).* The Activity Plan for Alternative 3 describes in more detail the management of recreation within these zones. The size, location, and configuration of Zone 1 would be the same under Alternatives 2, 3, and 4.

- Zone 1 (Roaded Natural) offers developed, concentrated activities for a wide range of visitor types. This zone has easy access with visitor, interpretive, and educational facilities. It generally allows day use with no public camping. Motorized traffic is directed to use designated parking, pullouts, and the loop drive. Recreation Zone 1 would consist of a half-mile-wide corridor along the entrance road (from Highway 83 to ranch headquarters). This zone would include ranch headquarters and Empire Gulch Spring and would encompass 1,109 acres of public land *(Proposal Common to Alternatives 2, 3, and 4).*

- Zone 2 (Natural) offers moderate access with infrequently maintained roads. Visitor use is concentrated in designated areas, including camping, parking, pullouts, and group sites. Visitor facilities and interpretation are limited. Under Alternative 3, Recreation Zone 2 would consist of 16,851 acres of public land, including land bounded by Oak Tree Canyon to the north and South Road to the east. This zone would also include a half-mile-wide corridor along the road from ranch headquarters to the Agricultural Fields and the public lands west of Highway 83.

- Zone 3 (Back Country/Semi-Primitive) offers low concentrations of visitors and a predominately natural environment. It has variable access that is likely to be difficult, low to no visitor facilities, limited signs, and dispersed low-impact recreational opportunities. Under Alternative 3, Recreation Zone 3 would consist of the remaining 31,040 acres of public lands in the planning area.

Livestock Grazing Management: Allocate 43,895 acres of public land for livestock grazing and continue to authorize livestock grazing on the Empire-Cienega, Empirita, Rose Tree, and Vera Earl allotments (Table 2-10). BLM would also allocate acreage for livestock grazing on the 2,480 acres of public lands in the Empire Mountains, where a new grazing allotment would be established (Map 2-9). BLM would authorize grazing use in riparian pastures and exclosures only to meet a resource objective. The Activity Plan for Alternative 3 includes detailed narratives of livestock grazing management for each of these allotments, including grazing strategies, initial allocations, and proposed range improvements.

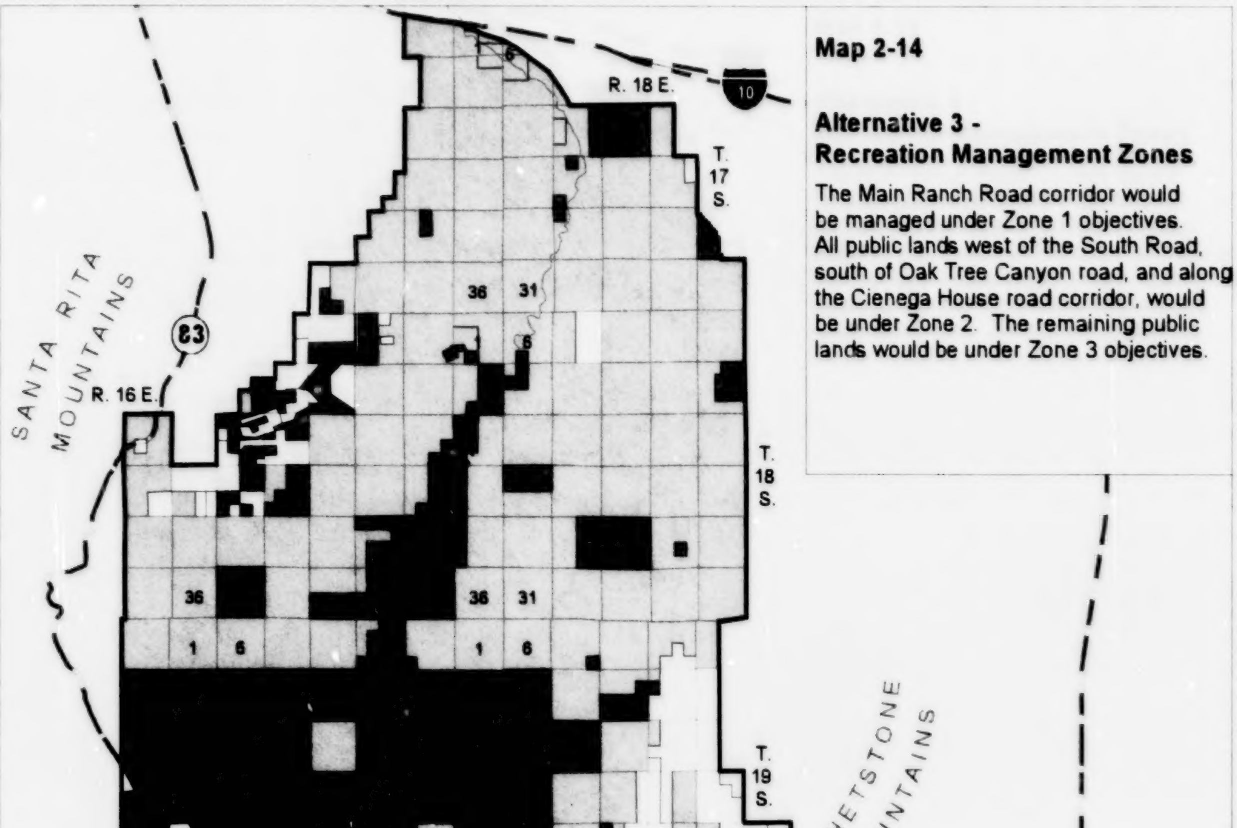
Special Designation Areas

Under Alternative 3, BLM would make the following special designations:

Areas of Critical Environmental Concern: Designate two ACECs on 4,859 acres of public land within the planning area:

- Designate 4,418 acres of public lands as the Cienega Creek ACEC (Map 2-16), which would include the entire perennial portion of Cienega Creek; perennial reaches of Gardner Canyon, Empire Gulch, and Mattie Canyon; and mesquite bosque and sacaton grasslands along the riparian areas.

- Designate 441 acres of public land as Nogales Springs ACEC, including Little Nogales and Nogales springs.



Map 2-14

Alternative 3 - Recreation Management Zones

The Main Ranch Road corridor would be managed under Zone 1 objectives. All public lands west of the South Road, south of Oak Tree Canyon road, and along the Cienega House road corridor, would be under Zone 2. The remaining public lands would be under Zone 3 objectives.

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N

2 0 2 4 Miles

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LEGEND

— Planning Area Boundary

▨ BLM Land

▨ State Land

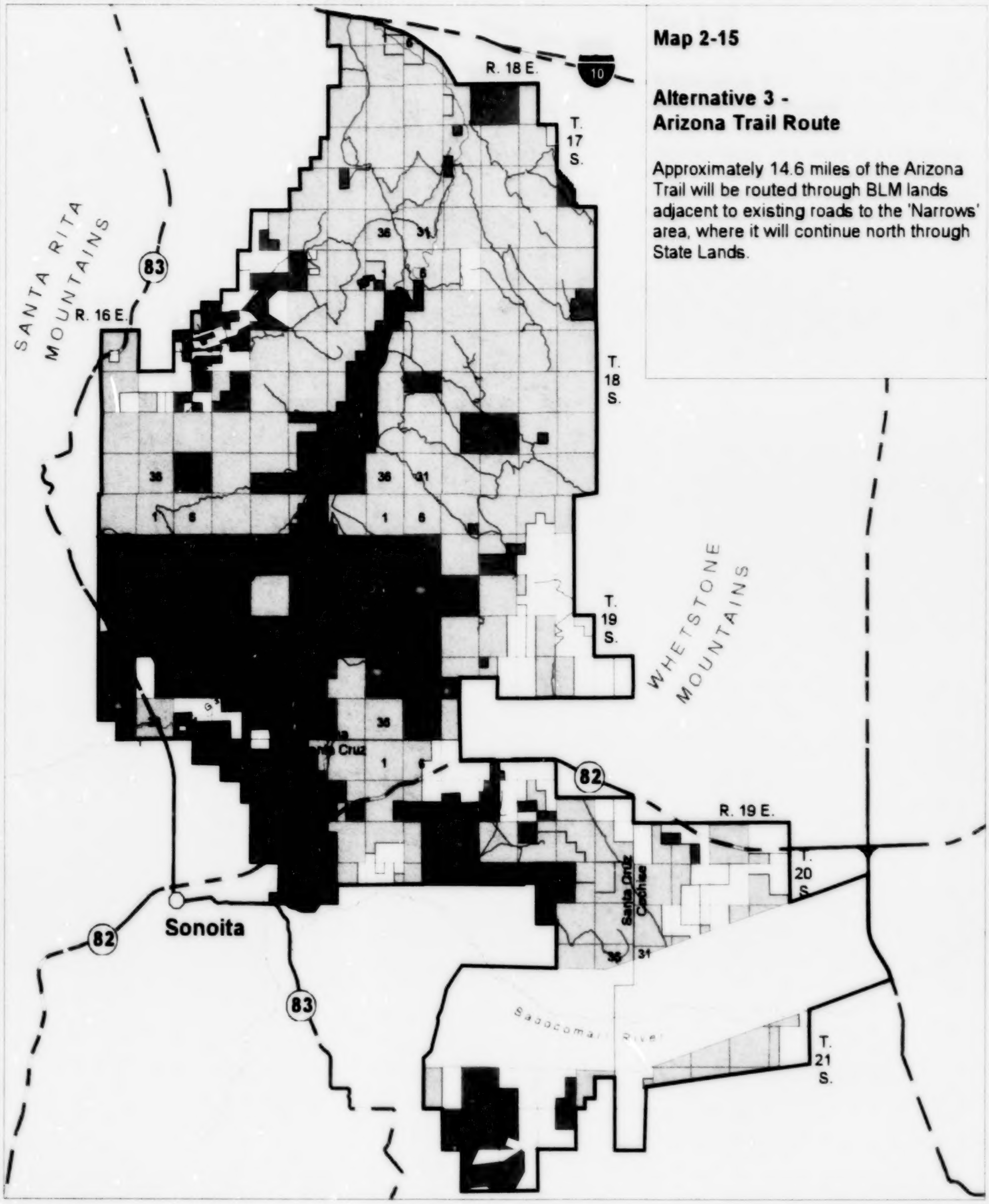
☐ Private Land

■ Zone 1

▨ Zone 2

▨ Zone 3

May 2001



Map 2-15

Alternative 3 - Arizona Trail Route

Approximately 14.6 miles of the Arizona Trail will be routed through BLM lands adjacent to existing roads to the 'Narrows' area, where it will continue north through State Lands.

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2 0 2 4 Miles

N

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TUCSON FIELD OFFICE

LEGEND

— Planning Area Boundary
■ BLM Land
▨ State Land
☐ Private Land
— Existing Road
▬ Arizona Trail Route

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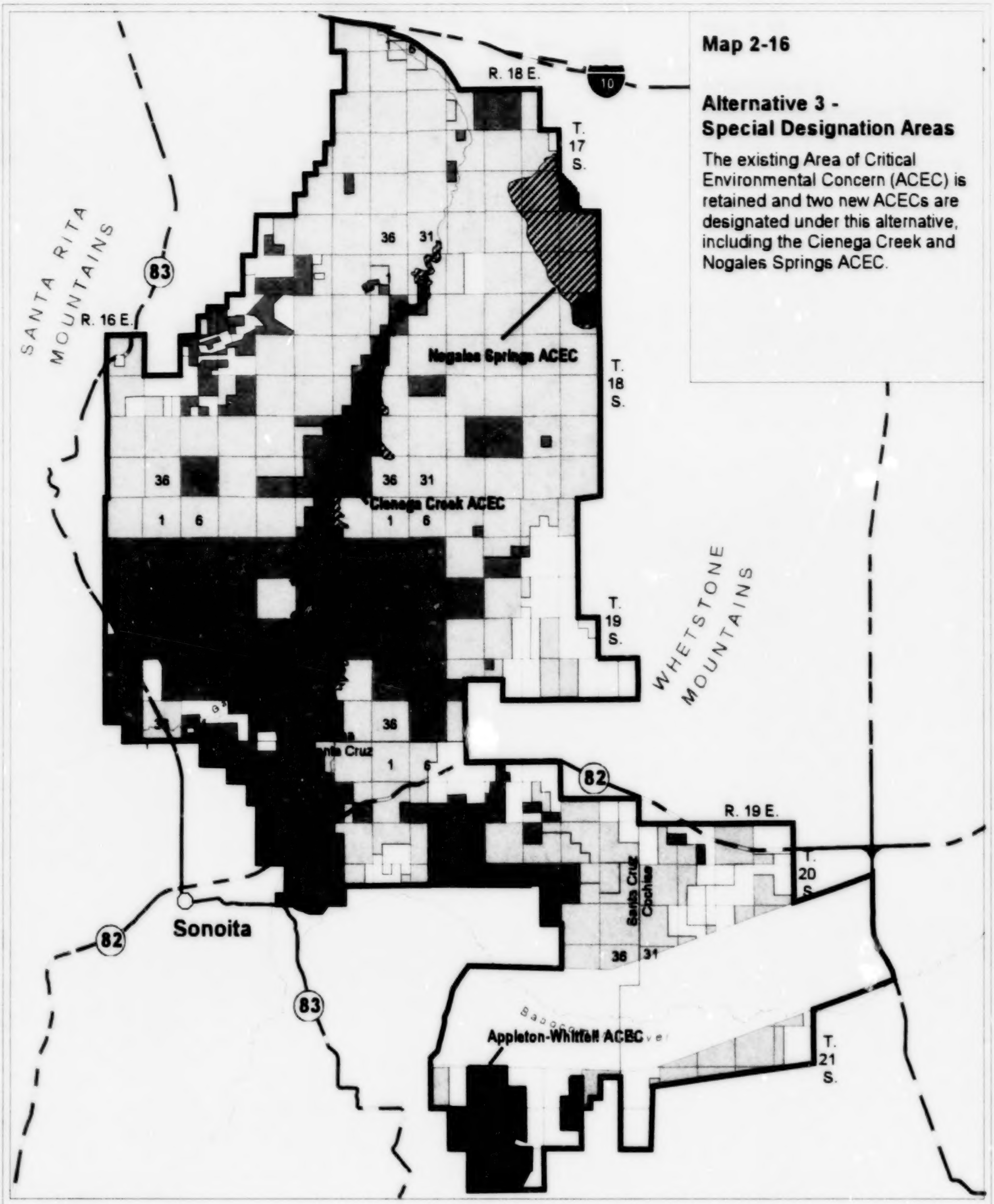

Map 2-16

Alternative 3 - Special Designation Areas

The existing Area of Critical Environmental Concern (ACEC) is retained and two new ACECs are designated under this alternative, including the Cienega Creek and Nogales Springs ACEC.

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LEGEND
— Planning Area Boundary
■ BLM Land
▒ State Land
□ Private Land
▨ Proposed ACEC
■ Existing ACEC

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Table 2-10. Livestock Grazing under Alternative 3, Las Cienegas Resource Management Plan

Allotment	Total Acres	Total Acres Grazed	[redacted]	[redacted]	ASLD Acres	Private Acres
Empire-Cienega (6090)	74,146	73,487	[redacted]	[redacted]	37,462	0
Empirita (6210)	24,988	24,948	[redacted]	[redacted]	23,468	0
Rose Tree (6043)	8,869	8,869	[redacted]	[redacted]	3,719	1,200
Vera Earl (6129)	1,440	1,440	[redacted]	[redacted]	0	na
Empire Mtns	3,524	3,524	[redacted]	[redacted]	0	1,044
TOTAL	**115,923**	**107,704**	[redacted]	[redacted]	**64,649**	**2,244**

[1] An additional 3,141 public land acres on the Appleton-Whittell ACEC would be excluded from livestock grazing and are not within an allotment, bringing the total public land acres excluded to 3,840.

Any State Trust and private lands acquired in the future within ACEC boundaries would be incorporated into the ACEC(s) and managed according to the prescriptions of this plan.

The proposed management prescriptions for Cienega Creek and Nogales Springs ACECs apply to the riparian areas and floodplains of Cienega Creek and Nogales and Little Nogales springs and are included in the Activity Plan for Alternative 3. These actions include proposals common to Alternatives 2, 3, and 4 and the proposals specific to Alternative 3. Table 2-9 summarizes the use restrictions within Cienega Creek and Nogales Springs ACECs under Alternative 3 and compares the restrictions of Alternative 3's ACEC proposals to those under Alternatives 2 and 4. Appendix 2 includes full descriptions of the ACECs and their management prescriptions. The Phoenix RMP (BLM 1988) prescribed management for the existing Appleton-Whittell Research ACEC. Appendix 2 also includes these prescriptions.

Wild and Scenic Rivers: Continue to manage the Cienega Creek Wild and Scenic Rivers Study Area to protect the resources pending congressional action on designation *(Proposal Common to All Alternatives).*

Alternative 4: Land Use Plan Proposals

Emphasizing land use closures and restrictions and limits on development as the approach to achieving desired resource conditions, Alternative 4 is the most restrictive of the alternatives. It would provide for the following:

- Public lands would remain closed to mining and would be closed to livestock grazing.
- All public lands would be designated as an area of critical environmental concern.
- A single utility corridor would be designated for major utility lines.

- The Arizona Trail corridor would use the existing road system and require shared use of motorized and non-motorized travel.
- More roads would be closed or restricted than under any other alternative.
- Both mechanized and motorized vehicles would be restricted to designated routes.
- Recreation developments would be limited to the smallest area.
- More area would be designated as recreation Zone 3–open to dispersed recreation with fewer restrictions–than under any other alternative.

Desired Resource Conditions

Under Alternative 4, BLM would do the following to meet desired resource conditions:

Watershed: Upland, Riparian, and Aquatic Management: Apply management to meet and maintain the goals and objectives (desired future conditions) for upland vegetation, riparian vegetation, and aquatic habitats as described for Alternative 2 *(Proposal Common to Alternatives 2,3, and 4).*

Fish and Wildlife Management: Apply management to meet and maintain the goals and objectives (desired future conditions) for fish and wildlife and place management emphasis on the four rare habitats that support 18 priority species as described for Alternative 2 *(Proposal Common to Alternatives 2,3, and 4).*

Visual Resource Management: Designate 49,000 acres of public land as visual resource management (VRM) Class II (see Appendix 2-Visual Management Classes for more detail) *(Proposal Common to Alternatives 2,3, and 4).*

Cultural Resource Management: Under Alternative 4, management of cultural resources in the planning area would be the same as under Alternative 1.

Recreation Management: Manage to maintain three recreation opportunity settings on public lands as described for Alternative 2 *(Proposal Common to Alternatives 2, 3, and 4).*

Land Use Allocations

Under Alternative 4, BLM would make the following land use allocations:

Fish and Wildlife Management: Manage suitable public land habitats for the recovery or reestablishing of native populations in collaboration with federal and state agencies, user groups, and other interested parties. Provide for reintroducing Gila topminnow into suitable habitats in accord with the existing BLM-Arizona Game and Fish Department memorandum of understanding. In addition, provide for reintroducing the following endangered, threatened, candidate, and priority species in accord with existing regulations, policies, and agreements *(Proposal Common to Alternatives 2, 3, and 4):*

- Gila chub
- Desert pupfish
- Southwestern willow flycatcher
- Aplomado falcon
- Native leopard frogs
- Black-tailed prairie dog
- Beaver
- Pronghorn
- Gould's turkey

Wildland Fire Management: BLM will suppress all natural or human-caused wildland fires by first addressing safety concerns to firefighters and the public, and then addressing resource concerns.

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Because of the planning area's small size and the proximity of an increasing number of homes in the wildland-urban interface, BLM has determined that it will not manage unplanned ignitions for the benefit of resources *(Proposal Common to All Alternatives).*

Mineral Development: Under Alternative 4, the 48,542 acres of acquired public land and any future acquired public land would remain closed to locatable and leasable mineral exploration and development and mineral material sales (Map 2-4). In addition, BLM would petition to withdraw the following from mineral location and leasing:

- 458 acres of public domain lands in the Empire Mountains,
- 4,474 acres of federal mineral estate with private surface.
- 1,440 acres of federal mineral estate with state surface.

Utility Corridors: Designate one major utility corridor across public lands in the northeast part of the planning area (Map 2-17). This 1/8-mile-wide corridor for overhead utility lines already has two such lines. Because of the configuration of the public land corridor and presence of intermixed State Trust Lands, the utility would also need to obtain a right-of-way from the Arizona State Land Department.

BLM would continue to consider other land use authorizations on a case-by-case basis with stipulations to any permits or leases to ensure consistency with the plan's goals and objectives.

Off- Highway Vehicle Management: Limit both motorized and mechanized vehicles to designated roads and trails on the 49,000 acres of public land according to the designated transportation system (Map 2-18) *(Proposal Common to All Alternatives).*

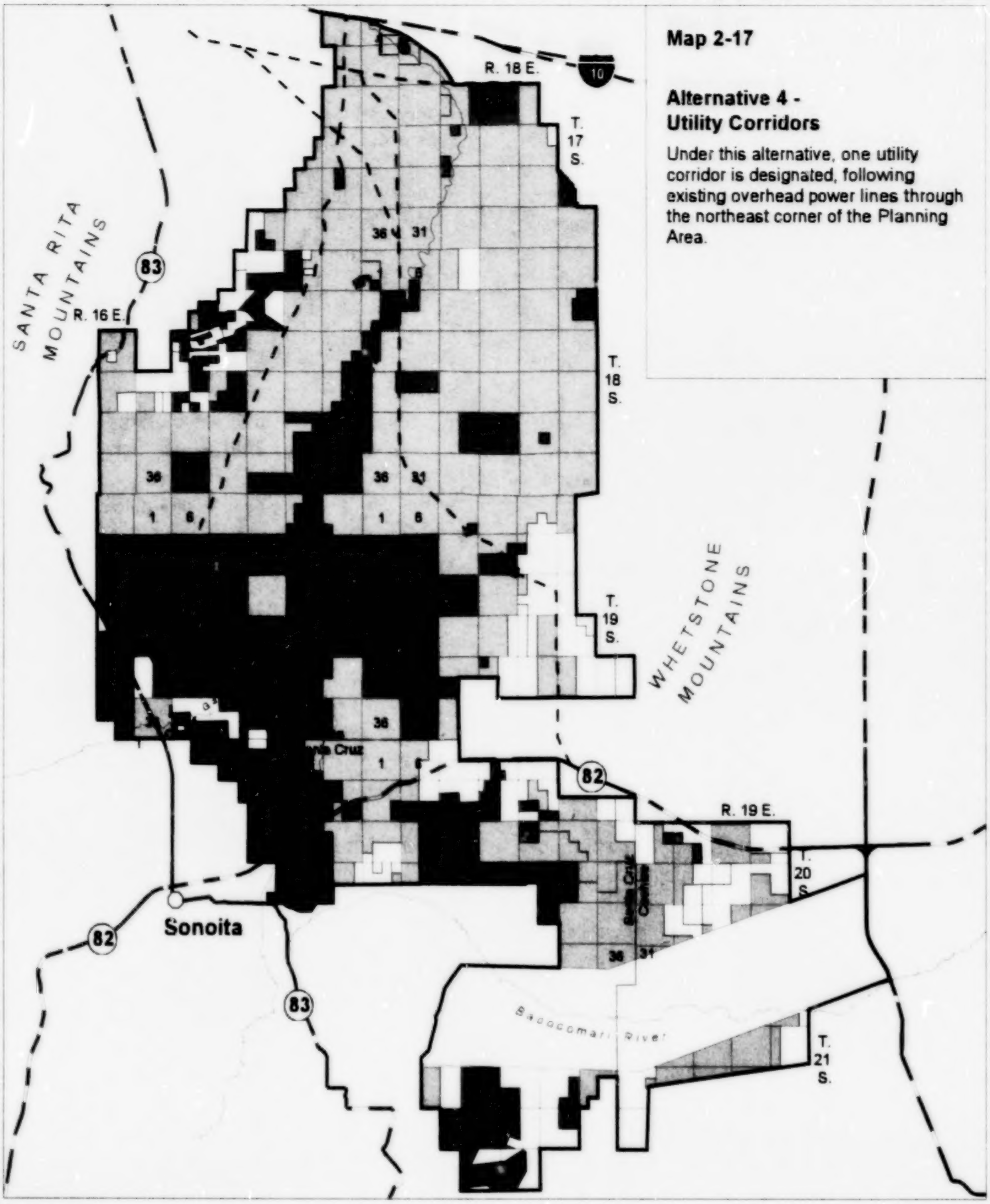
Under Alternative 4, BLM would make the following route designations on public lands:

- 86.8 miles open for public motorized travel.
- 1.1 miles open seasonally for public motorized travel.
- 28.5 miles designated for administrative use only.
- 0 miles converted to non-motorized trail for travel by mechanized vehicle, horse, or foot.
- 27.6 miles closed and rehabilitated.

In addition to the above miles of roads and trails, the designated transportation system will also include the *Heritage Discovery Trail* (a hardened interpretive trail at the Empire Ranch headquarters, which is described under the cultural resource management section of the Alternative 2 Activity Plan).

In addition, BLM will recommend to the Arizona State Land Department that similar designations be considered for the segments of these roads that cross intermixed State Trust Lands.

Legal public access has not been secured to many of the 86.8 miles of public land roads, that Alternative 4 would designate as open. In the future other landowners could close access on some roads or portions of roads. In addition, BLM might close roads or portions of roads seasonally, temporarily, or in emergencies where hazard or resource conditions warrant. To address resource or management concerns BLM might also build new road segments to replace existing roads. As described under the Activity Plan for Alternative 4, BLM would pursue legal public access on four road segments crossing Arizona State Trust Lands.



Map 2-17

Alternative 4 - Utility Corridors

Under this alternative, one utility corridor is designated, following existing overhead power lines through the northeast corner of the Planning Area.

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RESOURCE MANAGEMENT PLAN

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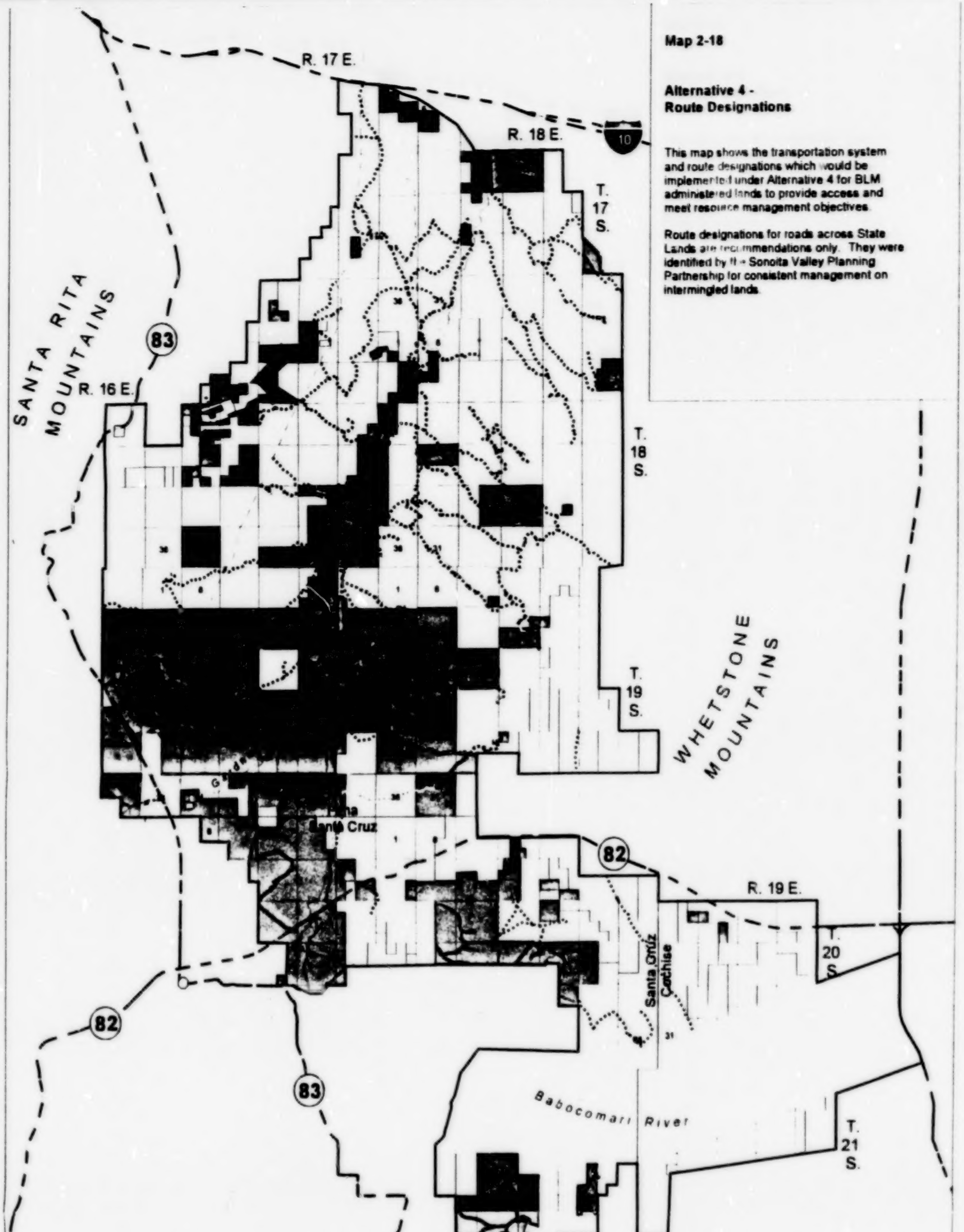
LEGEND

- — Planning Area Boundary
- ■ BLM Land
- ▨ State Land
- ☐ Private Land
- - - - Existing Utility Right of Way
- ▬ Designated Utility Corridor

May 2001



Map 2-18

Alternative 4 -
Route Designations

This map shows the transportation system and route designations which would be implemented under Alternative 4 for BLM administered lands to provide access and meet resource management objectives.

Route designations for roads across State Lands are recommendations only. They were identified by the Sonoita Valley Planning Partnership for consistent management on intermingled lands.

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RESOURCE MANAGEMENT PLAN

N

1 0 1 2 3 Miles

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— - — Planning Area Boundary

■ BLM Land	■ County Land
☐ State Land	☐ Private Land

97

ROUTE DESIGNATION LEGEND

STATE	BLM	
·········	———	Open to All Motorized Travel Year-Round
·········		Open to All Motorized Travel Only from July 1 to March 31
		New Route Construction, Opent to All Motorized Travel Year-Round
·········	———	Open to Administrative Motor Vehicle Use Only. Open to Non-Motorized Public Travel Year-Round
·········	———	Closed to All Motorized Travel. Maintained Open for Non-Motorized Travel Year-Round
·········	———	Closed to All Travel. Obliterate and Revegetate
·········	———	Roads Across Private/Non-Federal Land With No Legal Public Access

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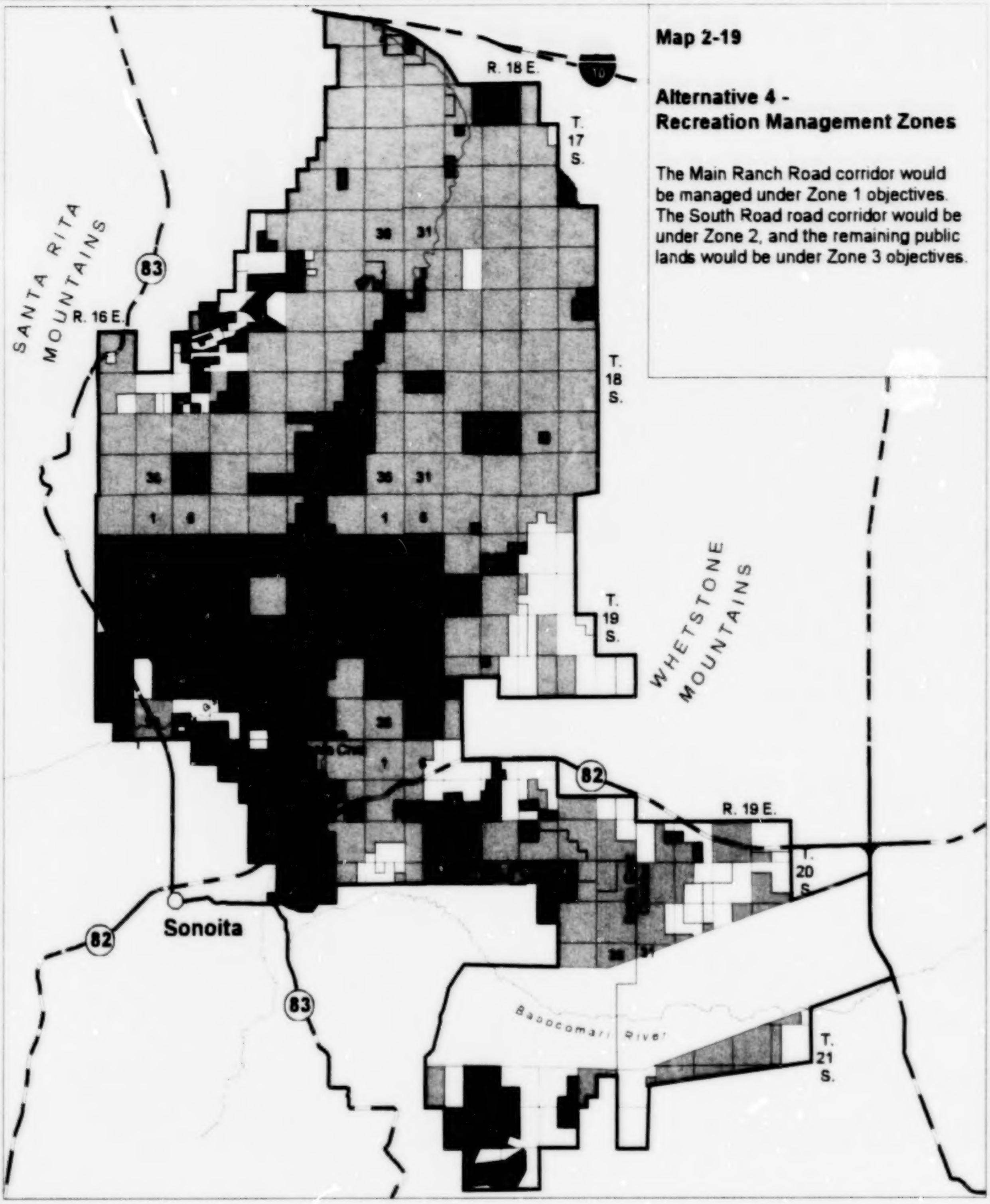
Map 2-19

Alternative 4 - Recreation Management Zones

The Main Ranch Road corridor would be managed under Zone 1 objectives. The South Road road corridor would be under Zone 2, and the remaining public lands would be under Zone 3 objectives.



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RESOURCE MANAGEMENT PLAN

2 0 2 4 Miles

N

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TUCSON FIELD OFFICE

LEGEND

— Planning Area Boundary

■ BLM Land

▒ State Land

□ Private Land

■ Zone 1

▨ Zone 2

░ Zone 3

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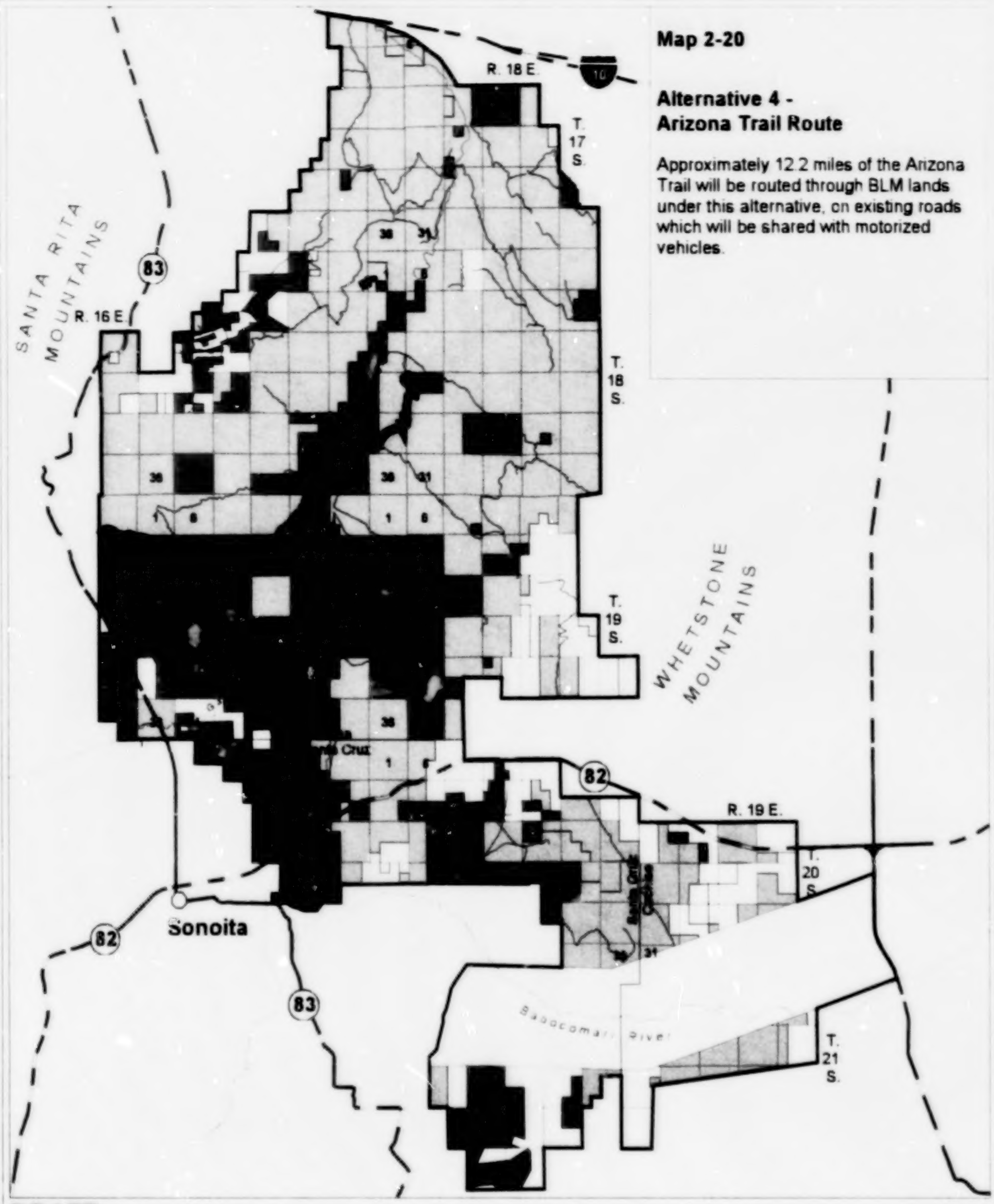

Map 2-20

Alternative 4 - Arizona Trail Route

Approximately 12.2 miles of the Arizona Trail will be routed through BLM lands under this alternative, on existing roads which will be shared with motorized vehicles.

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2 0 2 4 Miles

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LEGEND
— Planning Area Boundary
■ BLM Land
▨ State Land
☐ Private Land
— Existing Road
— Arizona Trail Route

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Arizona Trail: Designate a corridor for the Arizona Trail along 8 miles of existing roads on public lands (Map 2-20). The trail would be shared use (motorized and non-motorized), and no new trail would need to be built. To have a continuous trail, the corridor would also have to cross 6.5 miles of existing road on intermingled State Trust Lands. For the trail to cross State Trust Land, a right-of-way must be obtained from the Arizona State Land Department.

Recreation Management: Establish three recreation zones on public lands within the planning area (Map 2-19), and manage them to conform to the three recreation opportunity settings described in Table 2-7 (desired resource conditions) and in accord with the desired recreation goals and objective *(Proposal Common to Alternatives 2, 3, and 4).* The Activity Plan for Alternative 4 describes in more detail the recreation management within these zones. The size, location, and configuration of Zone 1 would be the same under Alternatives 2, 3, and 4.

- Zone 1 (Roaded Natural) would offer developed, concentrated activities for a wide range of visitor types. It would have easy access with visitor, interpretive, and educational facilities and would generally allow day use but no public camping. Motorized traffic would be directed to use designated parking, pullouts, and a loop drive. Recreation Zone 1 would consist of a half-mile-wide corridor along the entrance road (from Highway 83 to ranch headquarters). This zone would include ranch headquarters and Empire Gulch Spring and would encompass 1,109 acres of public land *(Proposal Common to Alternatives 2, 3, and 4).*

- Zone 2 (Natural) would offer moderate access with infrequently maintained roads, concentrated visitor use in designated areas (camping, parking, pullouts, and group sites) and limited visitor facilities and interpretation. Recreation Zone 2, a half-mile corridor along South Road, would consist of 2,161 acres of public land.

- Zone 3 (Back Country/Semi-Primitive) would offer a low concentration of visitors and a predominately natural environment, variable access that would likely be difficult, low to no visitor facilities; limited signs; and dispersed low-impact recreational opportunities. Under Alternative 4, Recreation Zone 3 would include the rest of the planning area's public lands–45,730 acres.

Livestock Grazing Management: BLM would not allocate forage for livestock grazing on public lands within four existing allotments. Livestock grazing leases would be canceled on 41,855 acres currently leased for grazing (Table 2-11):

Special Designation Areas

Under Alternative 4, BLM would make the following special designations:

Area of Critical Environmental Concern: Designate 45,859 acres of public lands as the Empire-Cienega ACEC (Map 2-10). This ACEC would include all of the public lands within the planning area except the 3,141 acres of public lands now within the Appleton-Whittell ACEC (Research Ranch), which would remain a separate ACEC but be renamed the Appleton-Whittell Research ACEC. Appendix 2 includes full descriptions of the ACECs.

Any State Trust and private lands acquired in the future within ACEC boundaries would be incorporated into the ACEC(s) and managed according to the prescriptions of this plan.

The Activity Plan for Alternative 4 is the proposed management plan for the Empire-Cienega ACEC, including management actions

Table 2-11. Livestock Grazing Leases to Be Canceled under Alternative 4, Las Cienegas Resource Management Plan

Allotment	Total Acres	Total Acres Grazed	[redacted]	ASLD Acres	Private Acres
Empire-Cienega (6090)	74,146	37,462	[redacted]	37,462	0
Empirita (6210)	24,988	23,468	[redacted]	23,468	0
Rose Tree (6043)	8,869	4,919	[redacted]	3,719	1,200
Vera Earl (6129)	1440	0	[redacted]	0	na
TOTAL	**109,443**	**65,849**	[redacted]	**64,649**	**1,200**

common to Alternatives 2, 3, and 4 and actions specific to Alternative 4.

Wild and Scenic Rivers: Continue to manage the Cienega Creek Wild and Scenic Rivers Study Area to protect the resources pending congressional action on designation *(Proposal Common to All Alternatives).*

PART B. ACTIVITY PLAN ALTERNATIVES

This section includes the four interdisciplinary activity plans that implement the land use plan alternatives. The Activity Plan for Alternative 1 is limited to the existing interim grazing plan and project-by-project considerations for other resource programs, including cultural resources, wildlife, and recreation. The activity plans for Alternatives 2, 3, and 4 have in common a series of actions to meet the desired resource conditions for upland and riparian vegetation, wildlife habitats, and cultural and visual resources. The activity plans for Alternatives 2, 3, and 4 vary mainly by the proposals for implementing livestock grazing decisions and recreation management. The first part of the Activity Plan for Alternative 2 describes and includes the proposals common to Alternatives 2, 3, and 4. The activity plans for Alternatives 3 and 4 refer the reader to Alternative 2 for the text of proposals common to the three alternatives.

Alternative 1: Activity Plan

The following actions, which describe ongoing management in the Empire-Cienega Planning Area, constitute the Activity Plan for Alternative 1 (current management). If Alternative 1 is selected, the assumption is that the following management approaches and level of management would continue.

Watershed: Upland, Riparian, and Aquatic Management Actions

Under Alternative 1, BLM would carry out the following actions in managing and restoring watersheds.

1. Consider vegetation treatments on a case-by-case basis to address specific resource issues. An integrated vegetation treatment program would not be developed.

2. Issue free use permits on a case-by-case basis for collecting plant materials for noncommercial use.

3. Control livestock use of riparian areas by building riparian fencing.

4. Repair eroding streambanks and other disturbed areas as significant problems are detected.

5. Include stipulations for group activity permits to reduce impacts to riparian areas, including limiting creek crossings to dry or designated crossing areas.

Fish and Wildlife Management Actions

Under Alternative 1, BLM would continue to carry out the following actions in managing fish and wildlife:

1. Use the Section 7 consultation process with the U.S. Fish and Wildlife Service to ensure that actions undertaken do not jeopardize the existence of endangered or threatened species or species proposed for listing (*Common to All Alternatives*).

2. Continue to implement the terms and conditions in existing biological opinions, including the following (see Appendix 2 for more detail):

   a. Ensure that livestock grazing on BLM-administered lands adheres to the BLM's Arizona Standards and Guidelines, Upland Livestock Utilization Standard, Safford Drought Policy, Arizona Ephemeral policy, and Riparian Area Policy.

   b. Work with other landowners to achieve a long-term upward trend in areas with fair or poor range condition.

   c. Work with the Natural Resource Conservation Service and landowners in the allotments to develop and implement watershed improvement projects that will increase infiltration.

   d. Continue to implement the following measures to protect lesser long-nosed bat roosts and foraging habitat from grazing impacts:

      - Ensure that road building and maintenance activities do not increase or facilitate public access to known day roosts of lesser long-nosed bats.

      - Conduct pre-construction surveys for paniculate agaves to avoid or minimize their injury and mortality during construction.

      - Design vegetation treatments, including prescribed fire, to minimize harm to paniculate agave and to ensure that no more than 20% of agaves that are burned during prescribed fire are killed by the fire.

      - Develop a mitigation plan in coordination with the Fish and Wildlife Service for any vegetation treatment, including prescribed fire within 0.5 mi of a bat roost or in areas that support paniculate agaves.

   e. Continue to implement the following measures to protect jaguar and jaguar habitat from grazing impacts:

- Maintain dense, low vegetation in the Cienega Creek riparian corridor for jaguar.

- Do not subject jaguar to any predator control activities.

- Investigate all reports of observations of jaguars in coordination with the Fish and Wildlife Service and the Arizona Game and Fish Department.

f. Continue to implement the following measures to protect populations of topminnow and topminnow habitat from grazing impacts:

- Exclude riparian areas from grazing.

- Rotate use of crossing lanes and move cattle through them within 10 days.

- Continue developing adjacent upland waters and phasing out water gaps.

- Inspect and maintain riparian exclosure fences at least twice annually.

- Locate all new repressos (earthen stock ponds) to minimize the likelihood of floods or humans moving exotic fish and bullfrogs into topminnow habitat.

- Use repressos only when required to water cattle and allow repressos to dry when no longer needed to water cattle. Drain repressos if they do not dry within 6 months after their use ends.

- Monitor the fish community and habitat, including crossing lanes, grazed riparian zones, and repressos, to document the level of incidental take and to check for introduction of exotic fish and bullfrogs.

- Ensure that any changes in livestock management do not increase cattle use at Nogales and Little Nogales springs or along Cienega Creek.

- Develop mitigation plans in coordination with the Fish and Wildlife Service for range improvements and vegetation treatments which may harm the topminnow or its habitat.

g. Continue to implement the following measures to protect the southwestern willow flycatcher and its habitat from grazing impacts:

- Exclude livestock grazing from occupied or unsurveyed, suitable habitat during the southwestern willow flycatcher breeding season (Apr 1-Sept.1).

- Manage suitable willow flycatcher habitat so that its suitable characteristics are not eliminated or degraded.

- Manage potential willow flycatcher habitat to allow natural regeneration into suitable habitat as rapidly as possible.

- Control cowbirds within 5 miles of occupied habitat using suitable control methods if cowbird concentrations indicate a strong likelihood that parasitism to flycatcher nests is occurring or if parasitism of a nest is documented.

- Do not authorize livestock management activities, including development of range improvements, in the riparian zone of unsurveyed, suitable or occupied willow flycatcher habitat during the willow flycatcher breeding season.

- Locate any new livestock management facilities that are likely to attract and support cowbirds more than 5 miles from occupied, suitable, or potential flycatcher habitat unless such facilities are crucial to protecting of the riparian habitat, and cowbird trapping is implemented to counteract the effect of the facility.

3. Cooperate with state and federal agencies, universities, conservation groups, and other organizations on proposals, including fish and wildlife research, fish and wildlife habitat improvement projects, inventory and monitoring of species and habitats, and mitigation of impacts from other activities (*Common to All Alternatives*).

   Some wildlife actions under current management have included the following:

   - Modifying and removing fences for pronghorn in selected areas.
   - Providing permanent water for wildlife at livestock developments.
   - Studying grassland sparrows, grasshoppers, native fish, and vegetation.

4. Accomplish some proposed actions from the Gila Topminnow Recovery Plan as BLM obtains the resources. Actions under current management have included the following:

   - Partial inventory of stock tanks for exotic fishes and amphibians in portions of the Cienega Creek watershed.
   - Closing some road crossings on perennial portions of Cienega Creek.
   - Preliminary evaluation of sites for reintroduction areas.

Cultural Resource Management Actions

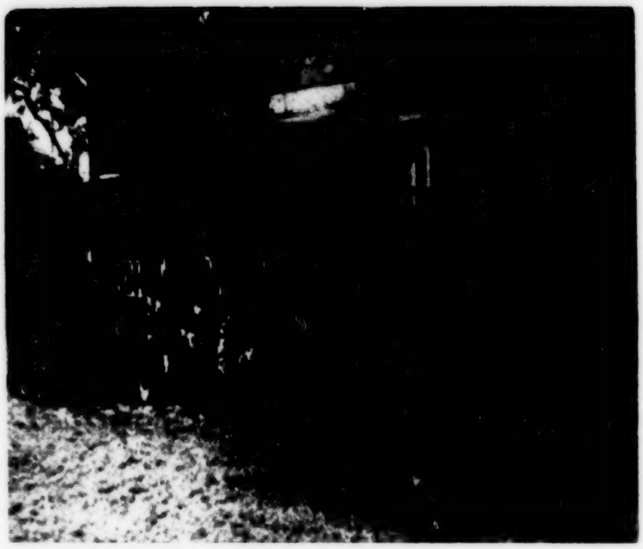
Management under Alternative 1 would allow cultural resources in the planning area to be conserved for future values, or used for scientific, public, or socio-cultural purposes through the following actions:

Empire Ranch Headquarters

1. Allocate the historically significant buildings at the Empire Ranch headquarters to public use *(Common to All Alternatives).*

2. Produce a cultural resource project plan (CRPP) in the form of a "master plan," for the Empire Ranch headquarters. Under Alternative 1, the Empire Ranch House would be stabilized but not restored. Public and educational programs would continue to consist of tours, presentations, occasional open houses, and special events. Learn-and-serve or other training programs would continue. Facilities would be signed for self-guided tours, and visitor facilities would be upgraded.

3. Evaluate and submit materials nominating the complex of historic buildings (built or placed before 1950) at the Empire Ranch headquarters to the National Register of



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Historic Places by 2003. (The Empire Ranch House is listed on the National Register) *(Common to All Alternatives).*

4. At the Empire Ranch headquarters continue to conduct basic stabilization/preservation work on historic buildings that are listed or eligible for listing on the National Register of Historic Places. Grant, partnership, volunteer, and other sources of funding and labor would be used to fund the preservation program. *(Common to All Alternatives).*

5. Stabilize and maintain all eligible or listed historic structures in accord with the Secretary of the Interior's *Standards and Guidelines for the Treatment of Historic Properties* and *Standards and Guidelines for Rehabilitating Historic Buildings on the National Register (Common to All Alternatives).*

6. Manage and maintain at BLM standards for safety, accessibility, and occupancy, buildings and structures within the complex that are not eligible for listing on the National Register of Historic Places, including recreational facilities, storage buildings, sheds, shops, and occupied structures *(Common to All Alternatives).*

7. Continue partnership with the Empire Ranch Foundation and other interested groups in the following:

   - Planning uses of the headquarters complex.

   - Stabilizing/preserving structures at the headquarters.

   - Collecting, preserving, and interpreting historic information and materials about the Empire Ranch and the surrounding area.

   - Volunteer projects.

   - Educational programs *(Common to All Alternatives).*

8. Actively maintain and provide opportunities for the public to volunteer for projects to preserve, conserve, and study the planning area's cultural resources *(Common to All Alternatives).*

9. Manage the ranch headquarters to include support of historic ranching operations, administration of BLM programs, and protection in the planning area, and public uses emphasizing education, research, interpretation, and visitation *(Common to All Alternatives).*

10. Continue producing limited interpretive materials (brochures, website information, news/features) about Empire Ranch history *(Common to All Alternatives).*

Cultural Properties outside the Headquarters Area

1. Open selected sites outside the headquarters to scientific and historical study by qualified researchers and scholars. (See Appendix 2 for detailed description of this action).

2. Conduct Class III cultural resource surveys of 116.4 miles of roads and trails leading through the planning area by 2004. Data from these surveys would be used to make future allocation and use decisions.

3. Conduct Class III cultural resource surveys of about 40,000 acres by 2005. Data from these surveys would be used to make future allocation and use decisions.

4. Conduct an ethnoecological study of the planning area, complete with report, by 2003 *(Common to All Alternatives).*

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5. Work with Native Americans, including the Tohono O'odham Nation, the Hopi Tribe and the San Carlos Apache Tribe, to select harvesting areas and allow noncommercial collection of bear grass, cottonwood, acorns and medicinal/ceremonial herbs by 2001 *(Common to All Alternatives).*

Access and Transportation Management Actions

Under Alternative 1, BLM would carry out the following actions in managing access and transportation:

1. Continue to use BLM-produced information and interpretive materials to describe access to the Empire-Cienega Planning Area at the Highway 82 and 83 access points.

2. Continue partial implementation of a designated road system for the planning area, including partial road numbering, access guide (map), and closing of new wildcat roads, but not complete a comprehensive road system with determinations on open, closed, and restricted roads and road segments.

Recreation Management Actions

Under Alternative 1, BLM would carry out the following actions in managing outdoor recreation:

1. Issue special recreation use permits on a case-by-case basis according to BLM policies and in compliance with the National Environmental Policy Act.

2. Inform planning area visitors (persons and groups) that they must obtain recreation permits from the Arizona State Land Department if they are to engage in any activities on State Trust Lands other than hunting with a valid hunting license. Although BLM states this ASLD requirement in its publications, including the Empire-Cienega Access Guide, many visitors are not aware of the mixed land ownership and that State Trust Lands are not public lands.

3. Only infrequently maintain roads as needed and as resources are available.

BLM would not develop a recreation management program, including interpretation and maintenance.

Administrative Sites Management Actions

Designate the Empire Ranch headquarters (80 acres), Hummel Ranch buildings (10 acres), Cienega Ranch buildings (5 acres), and High Lonesome buildings (10 acres) as administrative sites (Map 2-21). Buildings at these sites may be used for a variety of purposes, including housing, office space, visitor contact, and ranch management. Within the administrative site boundaries, the areas will be closed to discharge of firearms, camping, and other public uses not provided for in conjunction with the administrative use *(Proposal Common to All Alternatives).*

Mineral Resources Management Actions

Alternative 1 would establish no management guidelines for rock collecting or the administrative or casual use of mineral materials.

Livestock Grazing Management Actions

Under current livestock grazing management in the planning area (Alternative 1), four livestock operators continue to lease public lands on four individual grazing allotments (Empire-Cienega, Empirita, Rose Tree, and Vera Earl) (Table 2-12). Livestock graze a total of 107,704 acres within the four allotments. This total includes 41,855 acres of public lands that are currently authorized for livestock grazing; 64,649 acres of State Trust

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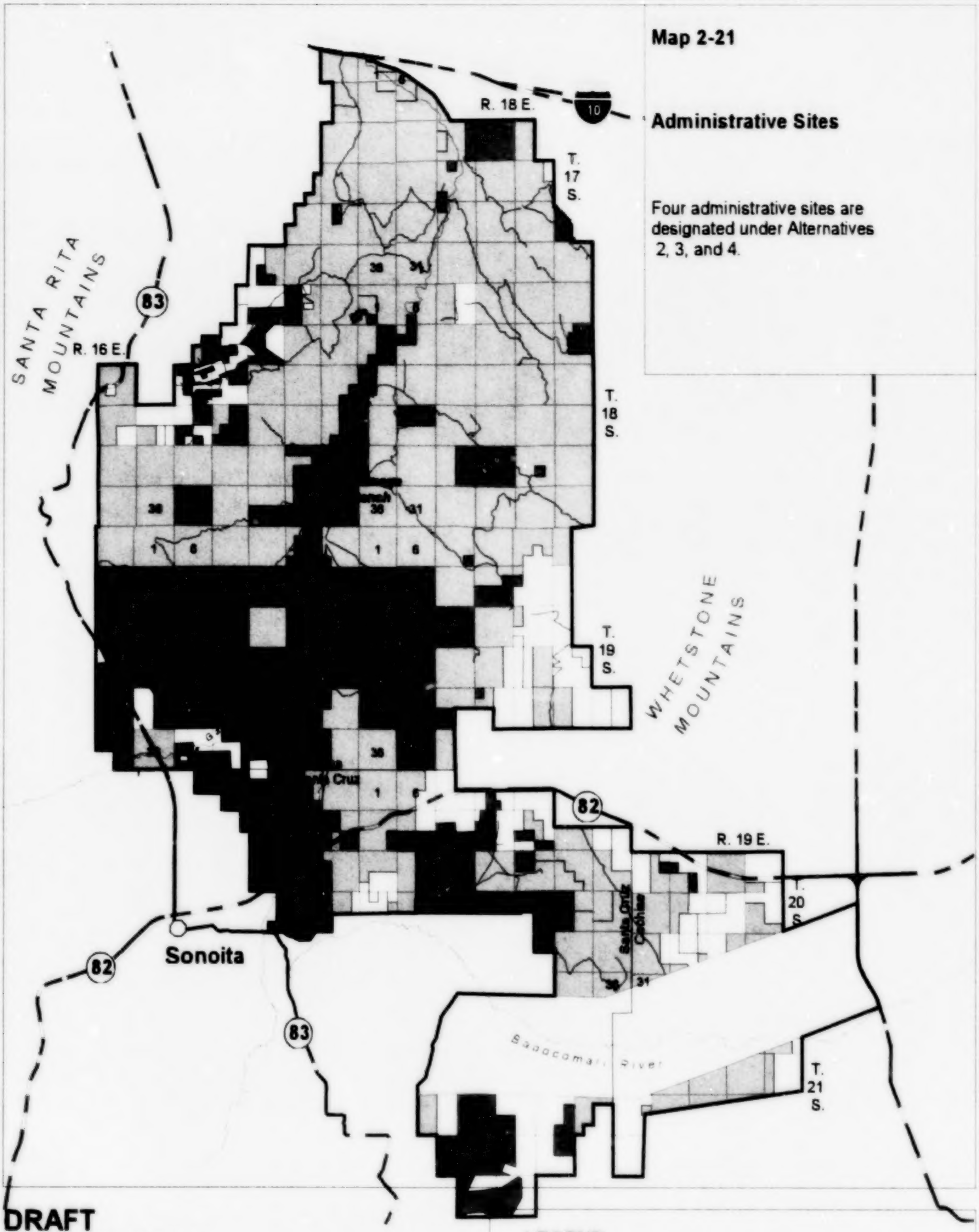

Map 2-21

Administrative Sites

Four administrative sites are designated under Alternatives 2, 3, and 4.

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LEGEND
— Planning Area Boundary
▩ BLM Land
▨ State Land
☐ Private Land
■ Administrative Site

May 2001

Table 2-12. Current Authorized Grazing Use, Las Cienegas Resource Management Plan

Allotment	Total Acres	Total Acres Grazed	Total Cows	BLM Acres Grazed	BLM Cows (CYL[1])	BLM Acres not Grazed	ASLD Acres	ASLD Cows	Private Acres	Private Cows
Empire	74,146	73,487	1,500	36,025	704	659	37,462	796	0	0
Empirita	24,988	23,908	337	440	9	1,080	23,468	328	0	0
Rose Tree	8,869	8,869	200	3,950	92	0	3,719	24	1200	84
Vera Earl	1,440	1,440	27	1,440	27	0	0	0	na	na
Empire Mountains	3,534	0	0	0	0	2,480	0	0	1,044 (not grazed)	0
TOTAL	**116,553**	**107,704**	**2,064**	**41,855**	**832**	**4,219**	**64,649**	**1,148**	**2,244** total (1,200 grazed)	**0**

[1] CYL = cattle year-long.

Lands, and 1,200 acres of private lands. The maximum stocking rate on the four allotments is 2,064 cattle on a year-long basis, according to the existing grazing leases for BLM, State Trust, and private lands. The current authorized use on public lands of 832 cattle on a year-long basis equates to 9,984 animal unit months (AUMs) of forage or 12.6 cows/section. The authorized public land use is 40% of the total livestock that could currently be run on the total acreage within the four allotments regardless of land ownership.

If the four allotments were stocked at the authorized maximum stocking rate of 2,064 cattle every year (which is **technically** allowed under current management), then the percentage of available forage consumed would approximate 44% in favorable years, 66% in normal years, and 100% in unfavorable years (Table 2-13). In reality, the public lands in these allotments have never been stocked at the authorized maximum stocking rate. The operators have voluntarily varied the stocking rates on the four allotments because of factors described below in the grazing management descriptions for each allotment.

Under Alternative 1, the biological planning process has been used for several years on the Empire-Cienega allotment to assist with determining appropriate stocking rates and adjusting pasture rotations in response to resource conditions and management concerns. Table 2-14 shows the total vegetation production in favorable, normal, and unfavorable years (based on rainfall) on all lands within the Empire-Cienega allotment. Also shown is the average amount of forage that livestock could consume on this allotment under variable stocking rates. The available forage is assumed to be 50% of the total vegetation produced multiplied by the current 50% utilization rate on those lands allocated for

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Table 2-13. Vegetation Production and Livestock Forage Consumption under Three Rainfall Regimes on Four Allotments, assuming livestock held at maximum stocking rates. Las Cienegas Resource Management Plan

	[redacted]	[redacted]	[redacted]	Production Consumed by Total Cows (million-lbs)	% Total Production Consumed	Available Forage (million-lbs)	% Available Forage Consumed
Favorable Year	[redacted]	[redacted]	[redacted]	19.81	11	44.88	44
Normal Year	[redacted]	[redacted]	[redacted]	19.81	16	29.92	66
Unfavorable Year	[redacted]	[redacted]	[redacted]	19.81	24	19.75	100

Table 2-14. Vegetation Production and Livestock Forage Consumption[1] under Three Rainfall Regimes, with Livestock Numbers Varied, on the Empire-Cienega Allotment. Las Cienegas Resource Management Plan

	[redacted]	[redacted]	[redacted]	Production Consumed by Total Cows (million-lbs)	% Total Production Consumed	Available Forage (million-lbs)	% Available Forage Consumed
Favorable Year	[redacted]	[redacted]	[redacted]	13.8	10.4	33.1	41.7
Normal Year	[redacted]	[redacted]	[redacted]	10.0	11.3	22.1	45.3
Unfavorable Year	[redacted]	[redacted]	[redacted]	6.4	10.9	14.7	43.5

livestock grazing. In contrast to the hypothetical example in Table 2-13, the percentage of available forage consumed remains fairly constant (between 41.5 and 45.5 %) under this management strategy.

The Following Are Highlights of Current Grazing Management

- On the four allotments grazing management strategies continue to incorporate various rotational philosophies.
- Livestock grazing on the Empire-Cienega allotment continues to be managed under the interim grazing plan (BLM 1995), which Appendix 2 summarizes in more detail. Livestock grazing on the Empirita Allotment would continue to be managed under the current coordinated grazing management plan (NRCS 1994). No management plan or monitoring is in place on either the Rose Tree or Vera Earl allotments.
- Only one of the current operations (Empire-Cienega) has begun a biological planning process to help guide management and resolve conflicts in proposed management.

- All allotments implement the current utilization limit. This limit restricts average utilization to 40-60% of current year's growth on key perennial grass species. This limit also assures that the physiological requirements of plant growth, rest, and reproduction are met for the following key species:

  Perennial Grasses
    plains lovegrass (ERIN)
    sideoats grama (BOCU)
    cane beardgrass (BOBA3)
    vine mesquite (PAOB)
    black grama (BOER4)
    hairy grama (BOHI2)
    sprucetop grama (BOCH)
    plains bristlegrass (SELE2)
    wooly bunchgrass (ELBA)
    green sprangletop (LEDU)
    Arizona cottontop (DICA8)
    crinkleawn (TRSP12)
    bush muhly (MUPO2)
    Prairie junegrass (KOCR)

  Shrubs and Succulents
    false mesquite (CAER)
    range ratany (KRPA)
    shrubby buckwheat (ERWR)
    Palmer's agave (AGPA)

Empire-Cienega Allotment (#6090)
BLM leases the federal lands in the Empire-Cienega allotment to John and Mac Donaldson for livestock grazing. This lease expires December, 31 2002. BLM also subleases the State of Arizona livestock grazing leases (05-1597 and 05-1623) to the Donaldsons

Summary of RMP-Level Proposal
Continue to allocate 36,025 acres of the 36,684 acres of public land in the Empire-Cienega allotment for livestock grazing. Exclude 659 acres from the regular livestock rotation

Summary of Current Empire-Cienega Grazing Management (Appendix 2)

1. Current management is a variable stocking rate with flexible livestock rotation-selective rest-rotation strategy (currently done voluntarily).

2. The current authorized stocking rate is 1,500 animal units on a year-long basis. But the lessee has chosen not to stock at the full capacity and has adjusted stocking rates whenever the resource snowed the need. The average number of cattle run on the allotment since 1993 has been 1,037 cattle year-long (CYL) with a high of 1,436 and a low of 662.

3. To address management concerns the lessees have developed and are using a biological planning process to assess and adjust proposed rotations. The composition and function of the current grazing plan and the biological planning process on the Empire-Cienega allotment are described in more detail in the Interim Grazing Management Plan for the Empire-Cienega Allotment (Appendix 2). The input from the Biological Planning Team helps rapidly adjust grazing in response to the health of the resource and the availability of forage.

4. BLM and the Arizona State Land Department adjust stocking rates in response to established carrying capacities, results of vegetation monitoring studies, and applications for voluntary nonuse.

5. BLM completed an ecological site inventory for the Empire-Cienega allotment in 1995.

6. BLM prepared an interim livestock grazing management plan for the Empire-Cienega allotment in 1995 (BLM 1995) to guide the management of livestock grazing in the Empire-Cienega Resource Conservation Area pending this amendment to the Phoenix

Resource Management Plan. The interim plan (Appendix 2) did or does the following:

  a. Prescribes how the livestock grazing operation will be run to sustain the resources.

  b. Established permanent vegetation monitoring sites.

  c. Determines what range improvements are needed.

7. Under the interim plan, BLM will authorize grazing use in the riparian pastures and exclosures only at watering points or crossing lanes or in limited circumstances to achieve a resource objective such as fuels reduction.

8. BLM completed a biological evaluation of the interim grazing plan, consulted with the U.S. Fish and Wildlife Service under Section 7 of the Endangered Species Act, and received a biological opinion from the Service (No. 2-21-95-F-177). BLM is now implementing the actions in the biological opinion (Appendix 2).

9. The current utilization limit restricts average utilization to 40-60% of the current year's growth on key perennial grass species as described for Alternative 1 summary.

10. Existing and proposed range improvements under the current interim grazing plan for the Empire-Cienega allotment are shown on Map 2-22.

Table 2-15 compares the current grazing management strategy for the Empire-Cienega Allotment to the alternative allotment management strategies.

Empirita Allotment (#6210) - Current Management

BLM leases a portion of the federal lands (440 acres) in the Empirita allotment to the Parsons Company for livestock grazing. BLM also subleases the State of Arizona livestock grazing lease (05-437) to the Parsons Company. In addition, 1,080 acres of federal lands, 550 acres of Pima County lands, and 320 acres of private lands within the allotment are neither owned nor leased by the Parsons Company.

Summary of RMP-Level Proposal

Continue to allocate 440 acres of the 1,520 acres of public land in the Empirita allotment for livestock grazing. The remaining 1,080 acres are not allocated for forage but are not physically excluded from livestock grazing by fencing.

Summary of the Current Empirita Grazing Management

1. The current grazing strategy is a deferred rotation grazing system with set stocking rates.

2. The Parsons are working with BLM, the Natural Resources Conservation Service (NRCS), and the Arizona State Land Department (ASLD) to develop range improvements to implement the grazing strategy.

3. The current authorized use is 337 CYLs at 3% public land use = 121 AUMs. The Parsons Company has been taking partial non-use since it leased the allotment while range improvements are being built to implement proper grazing management.

4. The grazing lessee works with the Natural Resources Conservation Service, BLM, and the Arizona State Land Department to determine pasture rotation and yearly adjustments in livestock numbers. No biological planning process is in place.

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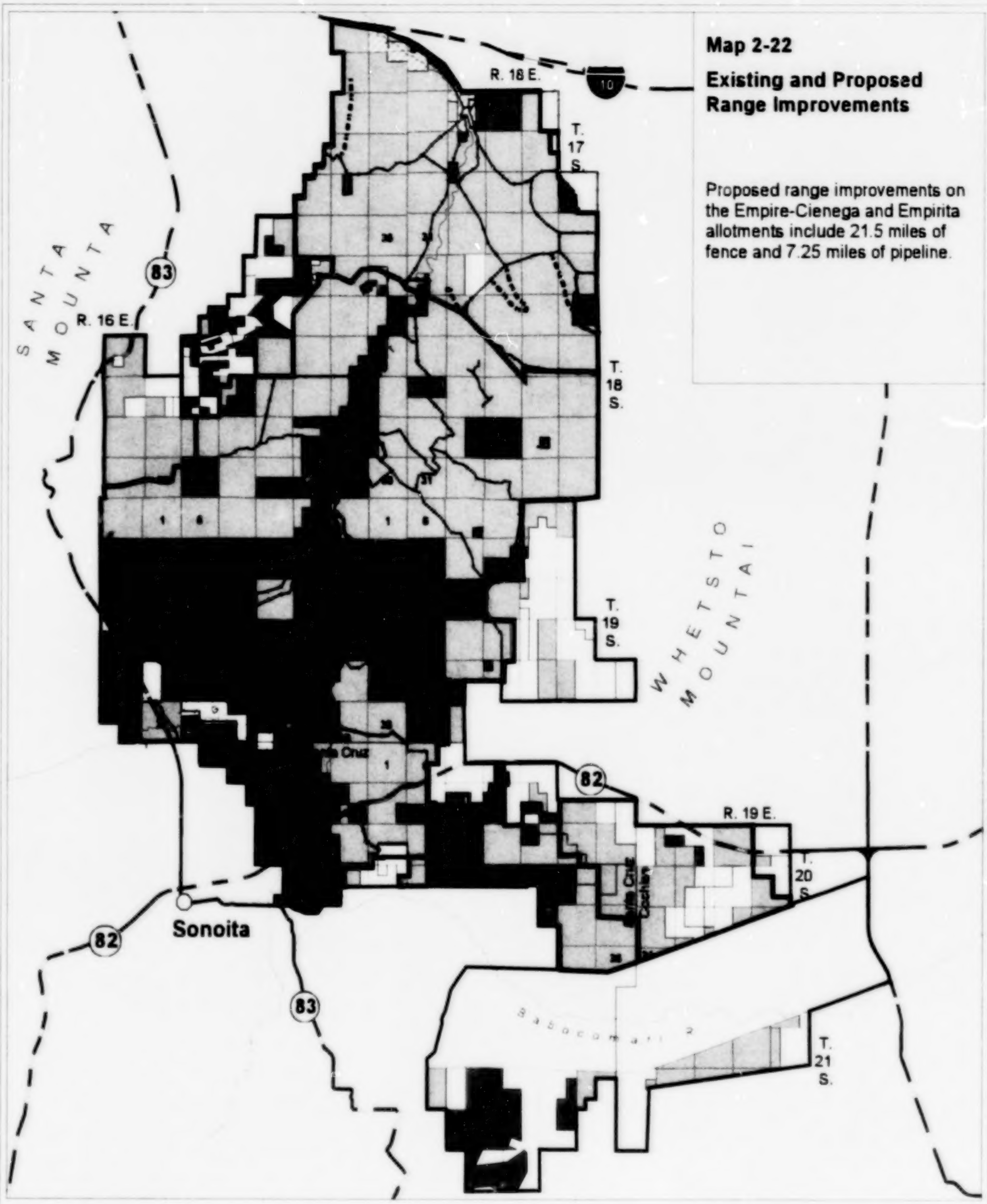

Map 2-22

Existing and Proposed Range Improvements

Proposed range improvements on the Empire-Cienega and Empirita allotments include 21.5 miles of fence and 7.25 miles of pipeline.

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- ― Planning Area Boundary
- ■ BLM Land
- ▨ State Land
- □ Private Land
- ▭ Grazing Allotments
- ― Pipeline, Existing
- ― Fence, Existing
- - - Pipeline, Proposed
- ― Fence, Proposed

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Table 2-15. Current and Proposed Livestock Grazing Management on the Empire-Cienega Allotment

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Acres (RMP Allocation)	public land acres: 36, 684 acres of forage allocated: 36,025 acres in exclosures: 659	public land acres: 36, 684 acres of forage allocated: 34,365 acres in exclosures: 2,319	public land acres: 36, 684 acres of forage allocated: 36,025 acres in exclosures: 659	All 36,684 public land acres excluded from livestock grazing.
Livestock Numbers	1500 cattle year-long (CYL) on allotment (49% BLM).	Numbers set annually in response to resource monitoring and evaluation through biological planning.	796 CYL on allotment (49% BLM).	0 on BLM lands; 796 CYL on State Trust lands within allotment.
Stocking Rate	Variable stocking rate (average in past years has been 1,037 CYLs, range of 662-1436).	Variable stocking rate.	Fixed stocking rate.	Set stocking rate on State Trust Lands.
Pasture Rotation	Flexible livestock rotation (selective rest rotation)	Flexible livestock rotation.	Scheduled deferred/rest rotation on a seasonal basis.	Unknown.
Monitoring Process	Decisions based on review of Biological Planning Team recommendations by BLM field manager.	Decisions based on monitoring of resource conditions and objectives and review of Biological Planning Team recommendations by BLM field manager.	Decisions based on livestock numbers, set rotations, and BLM/ASLD/NRCS monitoring. No Biological Planning Team.	Decisions by ASLD
Proposed Improvements	Build and maintain 12 range improvement projects to include: • 20.5 miles fence • 3 new wells with 3 tanks • 3 redeveloped wells (Map 2-22)	Same as Alternative 1 with more study exclosures.	Same as Alternative 1 without more exclosures	Build 85 miles of fence to exclude cattle from BLM lands.

ASLD = Arizona State Land Department; NRCS = Natural Resources Conservation Service.

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5. BLM and the Arizona State Land Department determine adjustments in the established stocking rates in response to vegetation monitoring studies and voluntary non-use.

6. BLM and Natural Resources Conservation Service completed an ecological site inventory of the rangelands on the Empirita allotment in 1994.

7. The Parsons Company Inc., Natural Resources Conservation Service, Arizona State Land Department, and BLM cooperatively developed a grazing management plan for the Empirita allotment in 1994. The plan (1) prescribed how the livestock grazing operation would be run to sustain the resources, (2) established permanent vegetation monitoring sites, and (3) determined needed range improvements.

8. No study exclosures exist.

9. Current grazing management restricts average utilization to 40-60% of the current year's growth on key perennial grasses as described in the Alternative 1 summary.

10. Existing and proposed range improvements under the current Empirita grazing plan are shown on Map 2-22.

Table 2-16 compares the current grazing management strategy for the Empirita allotment to the alternative allotment management strategies.

Rose Tree Allotment (#6043)

BLM leases the federal lands (3,950 acres) in the Rose Tree allotment to Rose Tree LLC for livestock grazing.

Summary of RMP-Level Proposal

Continue to allocate all 3,950 acres of public land in the Rose Tree allotment for livestock grazing.

Summary of Rose Tree Current Grazing Management

1. The current grazing strategy is a deferred rotation grazing system with set stocking rates.

2. The current stocking rate (authorized use) is 200 CYL at 46% public land use = 11,104 AUMs.

3. The lessee decides on pasture rotation and yearly adjustments in livestock numbers. No biological planning process is in place.

4. BLM and the Arizona State Land Department determine adjustments in established stocking rates from vegetation monitoring studies and voluntary non-use. These public lands are not currently being monitored.

5. An ecological site inventory of the rangelands has not been completed.

6. A grazing management plan has not been completed.

7. No study exclosures exist.

8. Current grazing management restricts average utilization to 40-60% of current year's growth on key perennial grass species as described in the Alternative 1 summary.

Table 2-17 compares the current grazing management strategy for the Rose Tree Allotment to the alternative allotment management strategies.

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Table 2-16. Current and Proposed Livestock Grazing Management for the Empirita Allotment

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Acres (RMP Allocation)	public land acres: 1,520 acres of forage allocated: 440 acres in exclosures: 0 acres w/out forage allocated: 1,080	public land acres: 1,520 acres of forage allocated: 1,000 acres in exclosures: 520	public land acres: 1,520 acres of forage allocated: 1,480 acres in exclosures: 40	Livestock excluded from all of 1,520 public land acres.
Livestock Numbers	337 CYL on allotment (2% BLM).	Numbers set annually in response to resource monitoring and evaluation through biological planning.	229 CYL on allotment (5% BLM).	0 on BLM Lands; 328 CYL on State Trust Lands in allotment.
Stocking Rate	Set stocking rate but have been running less (see narrative).	Variable stocking rate.	Set stocking rate.	Set stocking rate on State Trust Land
Pasture Rotation	Deferred rotation (partially implemented).	Flexible livestock rotation.	Deferred rotation.	Unknown rotation.
Monitoring Process	Decisions based on set livestock numbers, set rotations, and ASLD/NRCS/BLM monitoring.	Decisions based on resource conditions/objectives monitoring and review of Biological Planning Team.	Decisions based on set livestock numbers, set rotations, and ASLD/NRCS/BLM monitoring.	Decisions by ASLD.
Proposed Improvements	Build and maintain 7 range improvement projects to include: • 1 mile fence • 7.25 miles pipeline (1 new and 6.25 rebuilt) • 1 new well with storage • new storage/trough at old well • 2 corrals (Map 2-22)	Same as Alternative 1 with riparian exclosure at Narrows and at Nogales Spring. (Map 2-22)	Same as Alternative 2.	Build 11 miles of fence to exclude cattle from BLM lands.

ASLD = Arizona State Land Department; NRCS = Natural Resources Conservation Service.

Table 2-17. Current and Proposed Livestock Grazing Management for the Rose Tree Allotment

	Alternative 1	**Alternative 2**	**Alternative 3**	**Alternative 4**
Acres (RMP Allocation)	public land acres: 3,950 acres of forage allocated: 3,950 acres in exclosures: 0	public land acres: 3,950 acres of forage allocated: 3,550 acres in exclosures: 400	public land acres: 3,950 acres of forage allocated: 3,950 acres in exclosures: 0	All 3,950 public land acres excluded from livestock.
Livestock Numbers	200 CYL on allotment (45% BLM).	Numbers set annually from resource monitoring and evaluation through biological planning.	96 CYL on allotment (45% BLM).	None on BLM lands on allotment; 108 CYL on State Trust and private lands.
Stocking Rate	Set stocking rate.	Variable set stocking rate.	Set stocking rate.	Set stocking rate.
Pasture Rotation	Deferred rotation.	Flexible stocking rate.	Deferred rotation.	Unknown rotation.
Monitoring Process	Decisions based on set livestock numbers, set rotations, and ASLD/BLM monitoring.	Decisions based on resource conditions/objectives monitoring and Biological Planning Team review.	Decisions based on set livestock numbers, set rotations and ASLD/BLM monitoring.	Decision by ASLD.
Proposed Improvements	None currently proposed.	• Complete ecological site inventory. • Evaluate allotment, including need for grazing plan, range improvements, or both.	Same as for Alternative 2.	Build 12 miles of fence to exclude cattle from BLM lands.

ASLD = Arizona State Land Department

Vera Earl Allotment (#6129)
BLM leases the federal lands (1,440 acres) in the Vera Earl allotment to the estate of Bettie A. Beck for livestock grazing.

Summary of RMP-Level Proposal
Continue to allocate all 1,440 acres of public land in the Vera Earl allotment for livestock grazing.

Summary of Current Grazing Management

1. The current grazing strategy is a deferred rotation grazing system with set stocking rates.

2. The current stocking rate is 27 CYL on the BLM portion of the allotment (100% public land use). On the entire allotment the authorized use is about 282 CYL at 10% public land use = 338 AUMs (rounded to facilitate an even number of cattle for a year-long operation). The grazing lessee in coordination with the Forest Service decides on pasture rotation and yearly adjustments in livestock number, and voluntary non-use. No biological planning process is in place.

3. The Forest Service, BLM, and the operator determine adjustments in stocking rates from vegetation monitoring studies. The public lands in the allotment are not now being monitored.

4. An ecological site inventory of the rangelands has not been completed.

5. A grazing management plan has not been completed.

6. No study exclosures exist.

7. Current grazing management restricts average utilization to 40-60% of the current year's growth on key perennial grass species as described in the Alternative 1 summary.

Table 2-18 compares the current grazing management strategy for the Vera Earl Allotment to the alternative allotment management strategies.

Empire Mountains
Under Alternative 1 (current management), no grazing allotment has been established in the Empire Mountains although several applications have been filed with BLM requesting the establishment of a new allotment. Table 2-19 compares the grazing management strategies for the Empire Mountains under the four alternatives.

Alternative 2-Activity Plan (Agency Preferred)

The Activity Plan for Alternative 2 can be divided into two main sections. The first section includes management actions that are considered essential to achieving the resource objectives for the Empire-Cienega Planning Area and that therefore are actions common to the activity plans for all three action alternatives (Alternatives 2, 3, and 4). The second section includes livestock grazing and recreation management actions that differ among the alternatives.

Management Actions Common to Alternatives 2, 3, and 4

Watershed: Upland, Riparian, and Aquatic Area Management Actions

The following actions are proposed in support of the upland vegetation, riparian vegetation, aquatic, and fish and wildlife objectives:

1. Implement an integrated vegetation treatment program.

   The resource goals and objectives in this plan require maintaining desired plant communities where they are occurring and attaining desired vegetation states where existing conditions are not satisfactory. BLM will apply integrated vegetation treatment to meet vegetation objectives by directing desired changes in vegetation communities selected by the plan's monitoring and evaluation protocol. This proposed vegetation treatment program will respond to the many plant-control requirements for achieving resource objectives. With the proposed changes to livestock grazing, recreation, and other land uses, the vegetation treatments are designed to meet the resource objectives. The following are the general vegetation treatment prescriptions for each allotment:

   a. **Empire-Cienega** - Treat 11,582 acres of Sandy Loam Upland and Loamy Upland ecological sites. Methods would include combined mesquite cutting, applying herbicide to cut stumps, burning slash and shrubby vegetation, and deferring grazing (Map 2-23). Vegetation treatments may be prescribed for additional acreage in the future in response to vegetation monitoring.

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Table 2-18. Current and Proposed Livestock Grazing Management for the Vera-Earl Allotment

	Alternative 1	**Alternative 2**	**Alternative 3**	**Alternative 4**
Acres (RMP Allocation)	public land acres: 1,440 acres of forage allocated: 1,440 acres in exclosures: 0	public land acres: 1,440 acres of forage allocated: 1,240 acres in exclosures: 200	public land acres: 1,440 acres of forage allocated: 1,440 acres in exclosures: 0	All of 1,440 public land acres excluded from livestock grazing.
Livestock Numbers	27 CYL at 100% BLM.	Numbers set annually in response to resource monitoring and evaluation through biological planning.	16 CYL at 100% BLM.	0 on BLM Lands 255 CYL on private, State Trust, and USFS lands.
Stocking Rate	Set stocking rate.	Variable stocking rate.	Set stocking rate.	Set stocking rate.
Pasture Rotation	Deferred rotation.	Flexible livestock rotation.	Seasonal use (rotating the season).	Unknown rotation.
Monitoring Process	Decisions based on set livestock numbers, set rotations, and BLM monitoring.	Decisions based on resource conditions and objectives monitoring and Biological Planning Team review.	Decisions based on set livestock numbers, set rotations, and BLM monitoring.	Decisions by ASLD.
Proposed Improvements	None currently proposed.	• Complete ecological site inventory • Evaluate allotment, including need for grazing plan, range improvements, or both.	Same as Alternative 2.	Build 2 miles of fence to exclude cattle from BLM lands.

ASLD = Arizona State Land Department; USFS = U.S. Department of Agriculture Forest Service.

b. **Empirita** - Treat 8,324 acres of Limy Slopes and Limy Upland ecological sites. Methods would include prescribed burning and deferred grazing (Map 2-23). Vegetation treatments may be prescribed for additional acreage in the future in response to vegetation monitoring.

c. **Rose Tree** - Conduct ecological site inventory to determine the vegetation condition compared to the site potential and the upland vegetation objective. Evaluate the need for any vegetation treatments and develop proposed projects as suitable.

d. **Vera Earl** - None proposed.

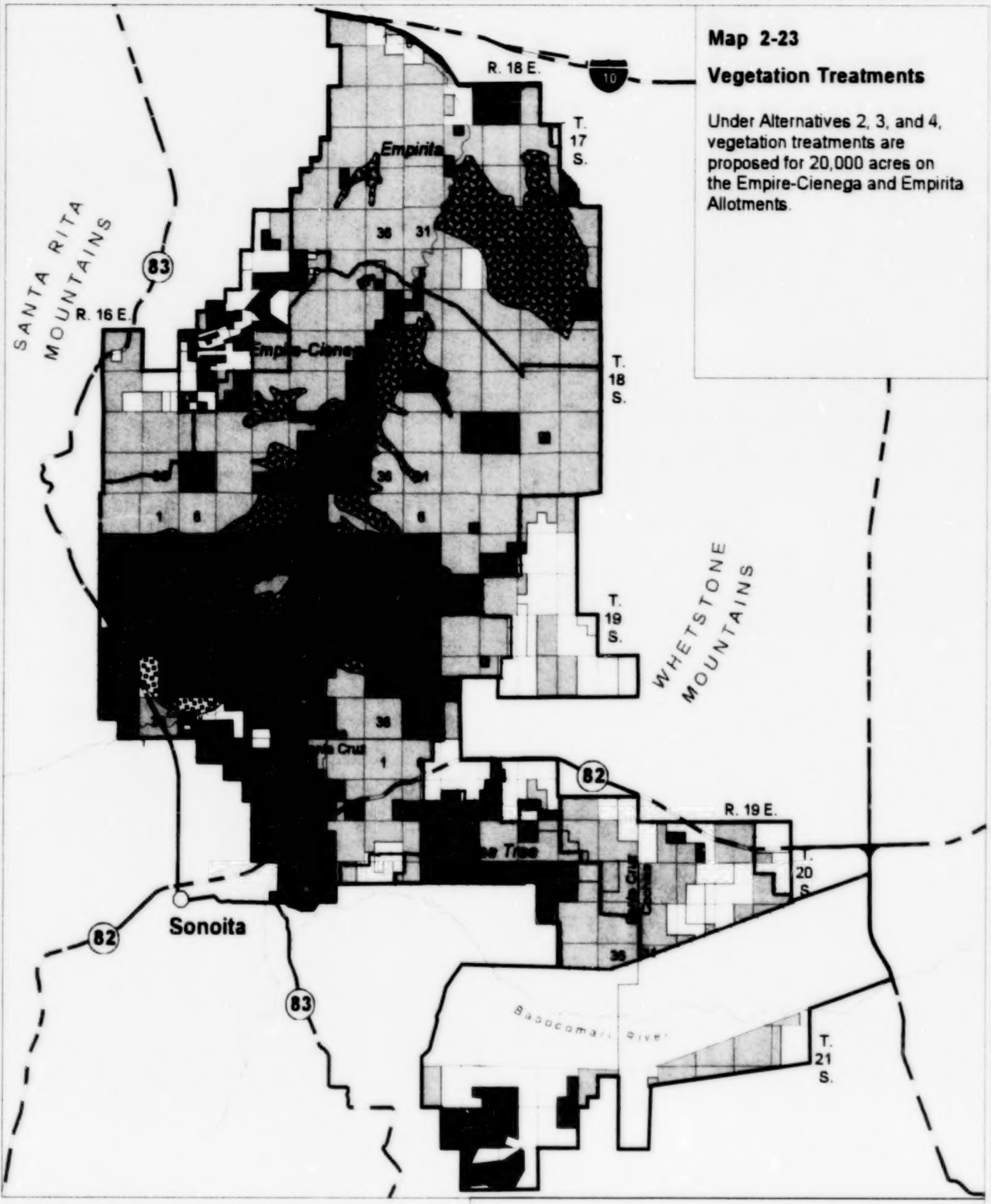
Table 2-19. Current and Proposed Livestock Grazing Management for the Empire Mountains

	Alternative 1	**Alternative 2**	**Alternative 3**	**Alternative 4**
Acres (RMP Allocation)	No allotment established on 2,480 public land acres in Empire Mountains.	public land acres: 2,480 acres of forage allocated: 2,000 acres in exclosures: 480	public land acres: 2,480 acres of forage allocated: 2,480 acres in exclosures: 0	No allotment established on 2,480 public land acres in Empire Mountains.
Livestock Numbers	N/A	Numbers set initially and then annually in response to resource monitoring and evaluation through biological planning.	38 CYLs at 70% BLM.	N/A
Stocking Rate		Variable stocking rate.	Set stocking rate.	
Pasture Rotation		Flexible livestock rotation.	Deferred rotation.	
Monitoring Process		Decisions based on resource conditions/objectives monitoring and review of Biological Planning Team.	Decisions based on set livestock numbers, set rotations, and BLM monitoring.	
Proposed Improvements		• Complete ecological site inventory. • Develop grazing plan to meet objectives and develop needed range improvements before authorizing any use.	Same as Alternative 2.	

Map 2-23

Vegetation Treatments

Under Alternatives 2, 3, and 4, vegetation treatments are proposed for 20,000 acres on the Empire-Cienega and Empirita Allotments.



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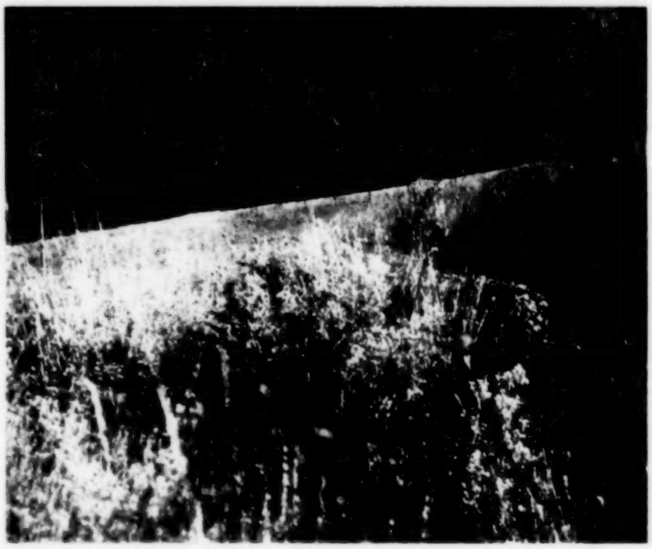
- Planning Area Boundary
- Grazing Allotment Boundary
- ☐ Private Land
- ▨ State Land
- ■ BLM Land
- ▦ Vegetation Treatment Area

May 2001

e. **Empire Mountains** - Conduct an ecological site inventory to determine the vegetation condition compared to the site potential and the upland vegetation objective. Evaluate the need for any vegetation treatments and develop proposed projects as suitable.

The proposed treatment program would allow the use of prescribed burning and chemical applications (mainly herbicides), as well as provide for the use of manual, mechanical, and biological treatments. The integrated vegetation management approach consists of selecting and integrating treatment methods for predicted ecological, sociological, and economic effects. BLM will select vegetation treatment methods for a particular project in response to site-specific analyses, which will consider several important parameters, including the following:



- Characteristics of the target plant species.
- Associated non-target plant species.
- Uses of the target area.
- Physical characteristics of the area to be treated.
- Climatic conditions at the time of treatment.
- Proximity to sensitive areas.
- Need for pretreatment of areas or later re-vegetation.
- Determining environmental effects.
- Feasible alternatives.

Appendix 2 describes the vegetation treatment methods in more detail.

2. Designate the public lands within the Empire-Cienega Planning Area as a noxious weed management area. (See Appendix 2 for more information.)

3. Remove or control nonnative vegetation species where monitoring finds that they threaten native species and where control is feasible and will not degrade ecosystem function over the long term.

4. Require permits for collecting and harvesting plant materials in any amount for commercial or noncommercial use. Assess on a case-by-case basis proposals for collecting and harvesting plants. Plant collections must contribute to or not conflict with maintaining or meeting the planning area's resource objectives.

5. Work with other entities within the watershed to maintain or improve watershed processes

and characteristics that affect infiltration, runoff, and sediment transport. Current sub-watersheds of concern include Gardner Canyon, Springwater Canyon, Fresno Canyon, and Apache Canyon.

6. Implement the existing watershed activity plan developed for Wood Canyon to stabilize erosion and restore the natural function of the drainage. The activity plan sets forth the following management prescriptions:
    a. Monitor the rate at which the gully system in lower Wood Canyon is advancing and the mechanism involved in this erosion process.
    b. Once the cause of erosion has been determined, develop methods for stabilization.
    c. Implement methods of erosion prevention in lower Wood Canyon and other areas where this type of erosion is advancing.
7. Repair eroding streambanks or terraces at abandoned stream crossings or other disturbed sites along Cienega Creek and its tributaries where erosion from these banks or terraces is harming riparian or aquatic habitats or function.
8. Limit motorized vehicles to designated roads and crossings on public lands (Maps 2-6, 2-13, and 2-18).
9. Limit crossings of Cienega Creek for permitted group activities to dry crossings or designated road or trail crossings. Designated road and trail crossings are shown on the designated road system maps (Maps 2-6, 2-13, and 2-18) for Alternatives 2, 3, and 4.
10. Prohibit recreational gold panning, dredging, or sluicing within Cienega Creek or its tributaries on public lands within the proposed areas of critical environmental concern (ACECs). ACEC boundaries for Alternatives 2, 3, and 4 are shown on Maps 2-10 and 2-16.
11. In riparian areas prohibit camping within 100 feet of each side of the stream channel (whether flowing or dry).
12. Minimize the building of developments in the 100-year floodplain. Limit developments to those needed to reduce impacts on riparian and aquatic areas.
13. Ensure that activities in riparian areas do not cause streambank stability to drop below 90%. Methods to protect streambanks could include education and restrictions on activities. Streambank stability is measured as a percentage of alteration to streambanks, including broken down, eroded, or denuded streambanks from any mix of activities.
14. Implement design changes on roads where change is found to be needed to halt excessive erosion or reduce other resource impacts.

Fish and Wildlife Management Actions

Under Alternatives 2, 3, and 4 BLM would carry out the following actions in managing fish and wildlife:

1. Use the Section 7 consultation process with the U.S. Fish and Wildlife Service to ensure that actions undertaken do not jeopardize the existence of endangered or threatened species or species proposed for listing (*Common to All Alternatives*).
2. Cooperate with state and federal agencies, universities, conservation groups, and other organizations on proposals, including fish and wildlife research, fish and wildlife habitat

improvement projects, inventory and monitoring of species and habitats, and mitigation of impacts from other activities (*Common to All Alternatives*).

3. Implement the following measures to protect lesser long-nosed bat roosts and/or foraging habitat:
    a. Ensure that road or trail building and maintenance activities do not increase or facilitate public access to known day roosts of lesser long-nosed bats.
    b. Conduct pre-construction surveys for paniculate agaves to avoid or minimize their injury and mortality during any construction.
    c. Design vegetation treatments, including prescribed fire, to minimize harm to paniculate agaves and to ensure that no more than 20% of agaves that are burned during prescribed fire are killed by the fire.
4. Develop a mitigation plan in coordination with the Fish and Wildlife Service for any vegetation treatment, including prescribed fire, within 0.5 mi of a bat roost or in areas that support paniculate agaves.
5. Implement the following measures to protect jaguar and jaguar habitat:
    a. Maintain dense, low vegetation in the Cienega Creek riparian corridor for jaguar.
    b. Do not subject jaguar to any predator control activities.
    c. Investigate all reports of observations of jaguars in coordination with the Fish and Wildlife Service and the Arizona Game and Fish Department.
6. Implement the following measures to protect southwestern willow flycatcher and flycatcher habitat:
    a. Manage suitable willow flycatcher habitat so that its suitable characteristics are not eliminated or degraded.
    b. Manage potential willow flycatcher habitat to allow natural regeneration into suitable habitat as rapidly as possible.
    c. Control cowbirds within 5 miles of occupied habitat using suitable control methods if cowbird concentrations indicate a strong likelihood that parasitism to flycatcher nests is occurring or if parasitism of a nest is documented.

Note: Other actions to protect southwestern willow flycatcher and flycatcher habitat from impacts of livestock grazing can be found in the livestock grazing management action sections of the Activity Plans for Alternatives 2 and 3.

7. Implement the Gila topminnow recovery plan to increase security for the Cienega Creek Gila topminnow population by the following:
    - Protecting surface water quality and quantity.
    - Protecting the creek from contamination by nonnative fish and frogs and their parasites.
    - Achieving and maintaining habitat integrity and function.

    Accomplish this action through the following:

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a. Securing enough instream flow rights for Cienega Creek to maintain the existing aquatic and riparian habitat in the creek for fish and wildlife (supports riparian and aquatic habitats and the Gila topminnow, longfin dace, Gila chub, native leopard frog, Sonoran mud turtle, Mexican garter snake, and other species dependent on flowing surface water).

b. In partnership with the Arizona Game and Fish Department (AGFD), controlling or removing exotic fishes and amphibians from stock tanks or streams in portions of the basin that drain into perennial parts of Cienega Creek. Coordinate with AGFD on the need to renovate (chemically treat) waters that contain exotic fishes and amphibians that threaten any native fishes or frogs.

c. Developing information and erecting signs on the need to protect Cienega Creek from exotic fish and other nonnative aquatic organisms.

d. Minimizing road access and crossings in the creek to decrease the opportunity for live releases of game fish and bait. Proposals for minimizing road access and crossings vary by alternative and are shown on the designated road system maps for Alternatives 2, 3, and 4 (Maps 2-6, 2-13, and 2-18).

e. Working with the Pima County Health Department to ensure that mosquitofish are not used as a biological control for mosquitos in the basin.

f. Evaluating and stocking three or more range extensions within the basin with Gila topminnow in cooperation with the Arizona Game and Fish Department and the U.S. Fish and Wildlife Service. Sites currently selected for reintroduction include Nogales and Little Nogales springs, Upper Empire Gulch, and Cinco Ponds.

Note: Other actions to protect Gila topminnow and topminnow habitat from impacts of livestock grazing can be found in the livestock grazing management action sections of the activity plans for Alternatives 2 and 3.

7. Reestablish, extend the distribution within historic ranges of, or supplement populations of the following wildlife species in the Sonoita Valley where determined to have suitable habitat and be compatible with other management activities:

   Aplomado falcon (*Falco femoralis*)
   Gould's turkey (*Meleagris gallopavo mexicana*)
   Gila topminnow (*Poeciliopsis occidentalis*)
   Desert pupfish (*Cyprinodon macularius*)
   Beaver (*Castor canadensis*)
   Gila chub (*Gila intermedia*)
   Pronghorn antelope (*Antilopcapra americana*)
   Native leopard frogs (*Rana* ssp.)
   Black-tailed prairie dog (*Cynomys ludovicianus*)

   (Other species may be considered as new information or management needs become known.)

   Accomplish this action through the following steps:

   a. Determine the population status and resources available (e.g. habitat quality, water availability) to wildlife species proposed for reestablishing, range extension, or supplementing.

   b. When habitat conditions have been determined to be suitable for the survival of any of the above species, coordinate the suitable action (reestablishing, range extension, supplementing) by established procedures with the suitable combination of agencies and land owners: Arizona Game and Fish Department, U.S. Fish and Wildlife Service, BLM, Arizona State Land Department, and affected private landowners.

9. Coordinate with the Arizona Game and Fish Department to remove or control nonnative species where monitoring finds that they threaten native species.

10. Manage for a mosaic of priority habitats (riparian/wetland, grassland, oak woodland, mesquite bosques) by applying vegetation treatments (including prescribed fire) as outlined in the integrated vegetation treatment program; reestablishing wildlife species where determined feasible through steps outlined above in #2; and periodically resting areas from grazing.

11. Take the following actions to meet Upland Vegetation Subobjective B for pronghorn antelope:

    a. Use prescribed fire and/or mechanical or chemical vegetation treatments as well as periodic rest from grazing to meet the habitat objective for pronghorn.

    b. Provide usable water sources within 1 mile of each other in pronghorn fawning areas and do not exceed 4 miles between usable water sources in pronghorn habitat. Evaluate and monitor suitability of waters and distance to permanent and functioning waters.

    c. Modify or remove fences that restrict pronghorn movement. Fences proposed for modification are shown on Map 2-24. Additional fences may be proposed for modification or removal in the future in response to monitoring data.

    d. Maintain fences that protect pronghorn from hazards (e.g. highway fences) and erect other restrictive fencing where needed.

    e. Investigate pronghorn use of highway underpasses and explore other partnership opportunities to help antelope cross highways. (Note: Include possibility of overpasses if highway is ever re-engineered. Using areas with cuts on each side would essentially form short tunnels for vehicles.)

    f. Recommend to the community through Sonoita Crossroads or another avenue that developments be encouraged to cluster homes to provide open movement areas that could double as community viewing locations for antelope.

    g. Recommend to the community through Sonoita Crossroads or other avenue that antelope-friendly fencing be installed in developments to ease antelope movement in the community.

    h. Minimize human disturbances by allowing where possible only low-use primitive camping and low-use livestock holding and handling areas in pronghorn habitat.

    i. Minimize road densities and redundant roads in pronghorn habitat by implementing the designated road network. Low-use dirt roads are preferable to high-use dirt, gravel, or paved roads.

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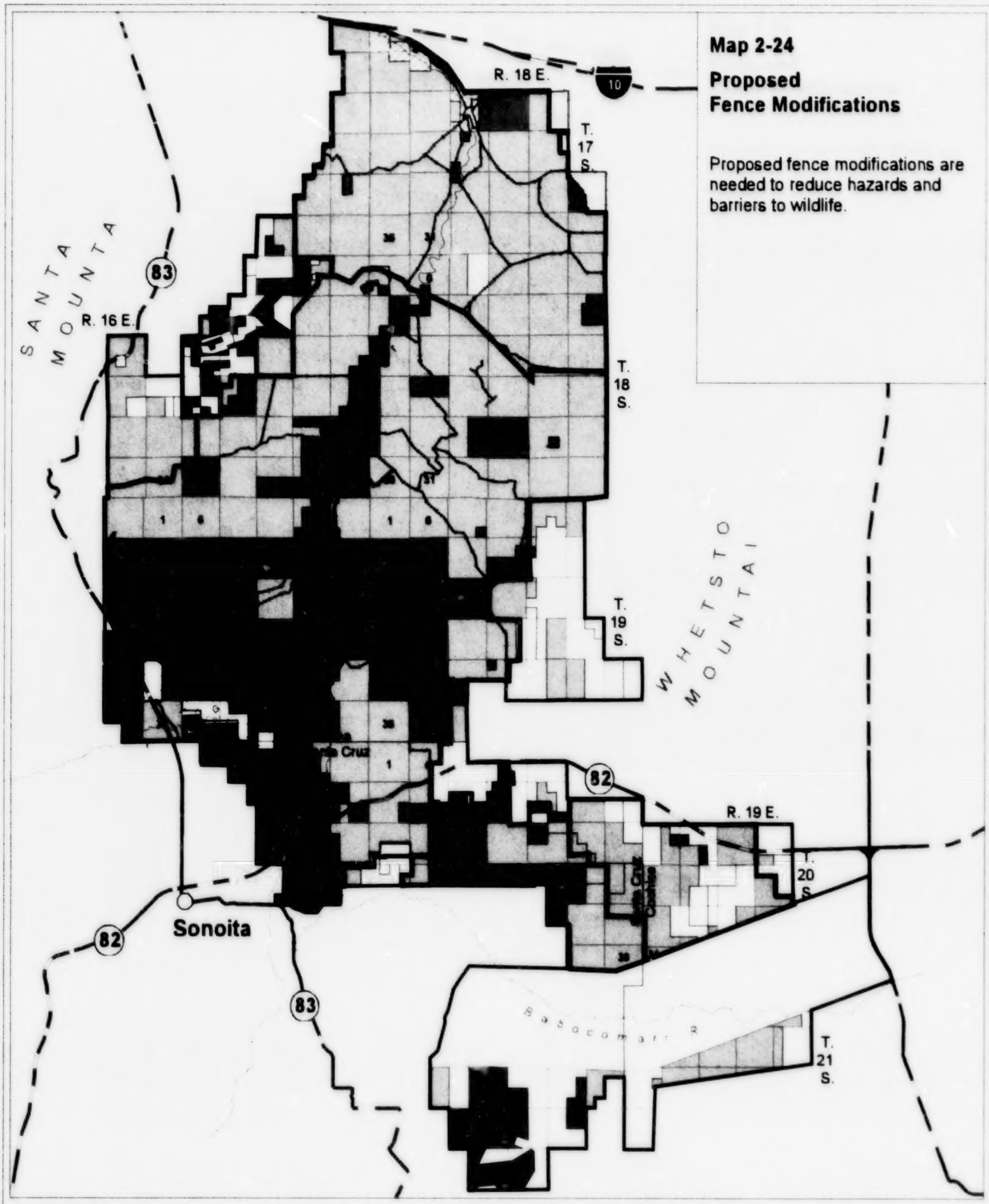

Map 2-24

Proposed Fence Modifications

Proposed fence modifications are needed to reduce hazards and barriers to wildlife.

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━	Planning Area Boundary
■	BLM Land
▨	State Land
□	Private Land
▭	Grazing Allotments
—	Pipeline, Existing
—	Fence, Existing
━	Proposed Fence Modification

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j. Develop partnership educational materials on pronghorn antelope.

k. Do not authorize dog trials in pronghorn habitat on public lands during the fawning season (April-June). Require that dogs be leashed during the fawning season in key fawning areas on public lands (Map 2-25).

Note: Other actions for pronghorn relating to managing livestock grazing can be found in the livestock grazing management actions section of the Activity plans for Alternatives 2 and 3.

12. To meet Upland Wildlife Habitat Subobjective A for grassland sparrow habitat, implement proposed vegetation treatments, including prescribed fire and other upland restoration actions, to reduce shrub canopy and enhance grass species diversity and cover, as described in the watershed restoration portion of this section.

13. Improve wildlife populations by reducing habitat fragmentation, establishing adequate movement/dispersal areas, and ensuring water sources. Accomplish this by the following:

    a. Modify or remove fences where feasible. Fences proposed for modification are shown on Map 2-24. Additional fences may be proposed for modification or removal in response to monitoring data.

    b. Remove or modify roads and rights-of-way as described in the road closures and restrictions portion for each alternative.

    c. Reduce human disturbance on public land in critical areas or during critical times of the year.

    d. Purchase conservation easements or land from willing sellers through the Land and Water Conservation Fund.

    e. Maintain existing water sources and provide supplemental water sources as found to be needed through water sources inventory and evaluation.

Cultural Resource Management Actions

Management of cultural resources under Alternatives 2, 3, and 4 differs from that under Alternative 1 in several ways. The master plan for the Empire Ranch headquarters provides for adaptive reuse of headquarters buildings and expanded interpretative, research, and education programs at the headquarters. A restoration program is proposed for selected buildings. And the headquarters is managed as a Zone 1 recreation area. Outside of the headquarters area, several sites are allocated to scientific use.

Empire Ranch Headquarters

1. Allocate the historically significant buildings at the Empire Ranch headquarters to public use *(Common to All Alternatives).*

2. Under Alternatives 2-4, the Cultural Resource Project Plan (CRPP) in the form of a "Master Plan," will provide for developing and implementing adaptive uses of the headquarters area and buildings for an array of compatible educational, research, interpretive, and administrative programs. Under Alternatives 2-4, the headquarters would be developed for public uses as a quality museum experience with a heritage discovery trail and expanded educational programs as described below *(Common to Alternatives 2, 3, and 4).*

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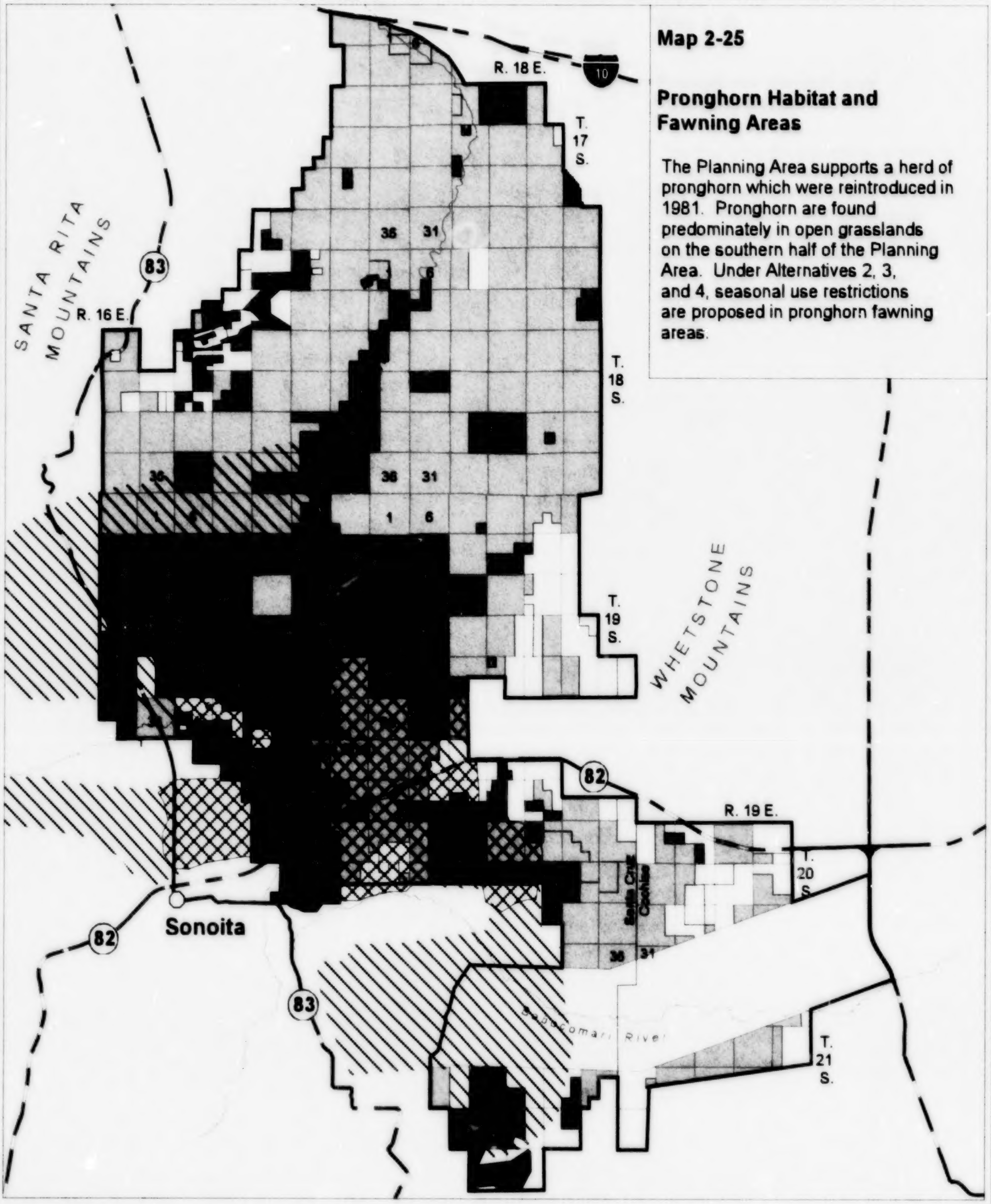
Map 2-25

Pronghorn Habitat and Fawning Areas

The Planning Area supports a herd of pronghorn which were reintroduced in 1981. Pronghorn are found predominately in open grasslands on the southern half of the Planning Area. Under Alternatives 2, 3, and 4, seasonal use restrictions are proposed in pronghorn fawning areas.



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LEGEND

— Planning Area Boundary

■ BLM Land

▨ State Land

□ Private Land

▧ Pronghorn Habitat

▦ Pronghorn Fawning Area

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   a. The Empire Ranch House would be stabilized, restored, and interpreted as a historic house or museum according to an adaptive reuse plan. Interpretive themes would include the ranch, local and regional history, events, and people.

   b. The *Heritage Discovery Trail* would be developed and interpreted for visitors, school groups, and recreationists. The accessible, hardened trail would connect Empire Ranch headquarters buildings, landscapes, structures, and features and provide wayside exhibits, signs, and observation points interpreting natural and cultural resources.

   c. *Education on the Empire* would be adopted as an educational program, built around historic and natural topics, which would feature the Discovery Corral and other programs for children and students, lifelong learning and professional training, and support for teachers.

3. Evaluate and submit materials nominating the complex of historic buildings (built or placed before 1950) at the Empire Ranch headquarters to the National Register of Historic Places by 2003. (The Empire Ranch House is listed on the National Register) *(Common to All Alternatives).*

4. At the Empire Ranch headquarters continue to stabilize and preserve historic buildings eligible for or listed on the National Register of Historic Places, and complete a restoration program for selected buildings. Use grant, partnership, volunteer, and funding and labor sources *(Common to Alternatives 2, 3, and 4).*

5. Stabilize and maintain all eligible or listed historic structures in accord with the Secretary of the Interior's *Standards and Guidelines for the Treatment of Historic Properties* and Standards and Guidelines for Rehabilitating Historic Buildings on the National Register *(Common to All Alternatives).*

6. Manage and maintain at BLM standards for safety, accessibility, and occupancy, buildings and structures within the complex that are not eligible for listing on the National Register of Historic Places, including recreational facilities, storage buildings, sheds, shops, and occupied structures *(Common to All Alternatives).*

7. Continue partnership with the Empire Ranch Foundation and other interested groups in the following:

   a. Planning use of the headquarters complex.

   b. Stabilizing/preserving structures at the headquarters.

   c. Collecting, preserving, and interpreting historic information and materials about the Empire Ranch and the surrounding area.

   d. Volunteer projects.

   e. Educational programs.
   (Common to All Alternatives)

8. Actively maintain and provide opportunities for the public to volunteer for projects to preserve, conserve, and study the planning area's cultural resources *(Common to All Alternatives).*

9. Manage the ranch headquarters to include support of historic ranching operations, administration of BLM programs, and protection in the planning area, and public uses emphasizing education, research, interpretation, and visitation (*Common to All Alternatives).*

10. Continue producing limited interpretive materials (brochures, web site information, news/features) about Empire Ranch history *(Common to All Alternatives).*

Cultural Properties outside the Headquarters Area

1. Allocate the Matty Canyon site complex, the Sandford Homestead site, and the Pump Canyon site to scientific use, and open them to scientific and historical study by qualified researchers and scholars. (See Appendix 2 for detailed description of this action) *(Common to Alternatives 2, 3, and 4).*

2. If determined feasible, develop selected sites could be developed for interpretation and public visitations. BLM would implement this action only if funds and staff are available to adequately develop an interpretive program that would not harm the resources.

3. Conduct Class III cultural resource surveys along 93.9 miles of roads and trails by 2004.

4. Conduct Class III cultural resource surveys of about 40,000 acres by 2005. BLM would use data from these surveys to make future allocation and use decisions.

5. Conduct an ethnoecological study of the planning area, complete with report, by 2003 *(Common to All Alternatives).*

6. Work with Native Americans, including the Tohono O'odham Nation, the Hopi Tribe, and the San Carlos Apache Tribe, to select harvesting areas and allow noncommercial collection of bear grass, cottonwood, acorns and medicinal/ceremonial herbs by 2001 *(Common to All Alternatives).*

7. Develop the headquarters as a Zone 1 recreational area in general, but with specific plans for headquarters access; trail loops; interpretive facilities; information signs; visitor facilities; and designated day, overnight and weekly uses. *(Common to Alternatives 2, 3, and 4).*

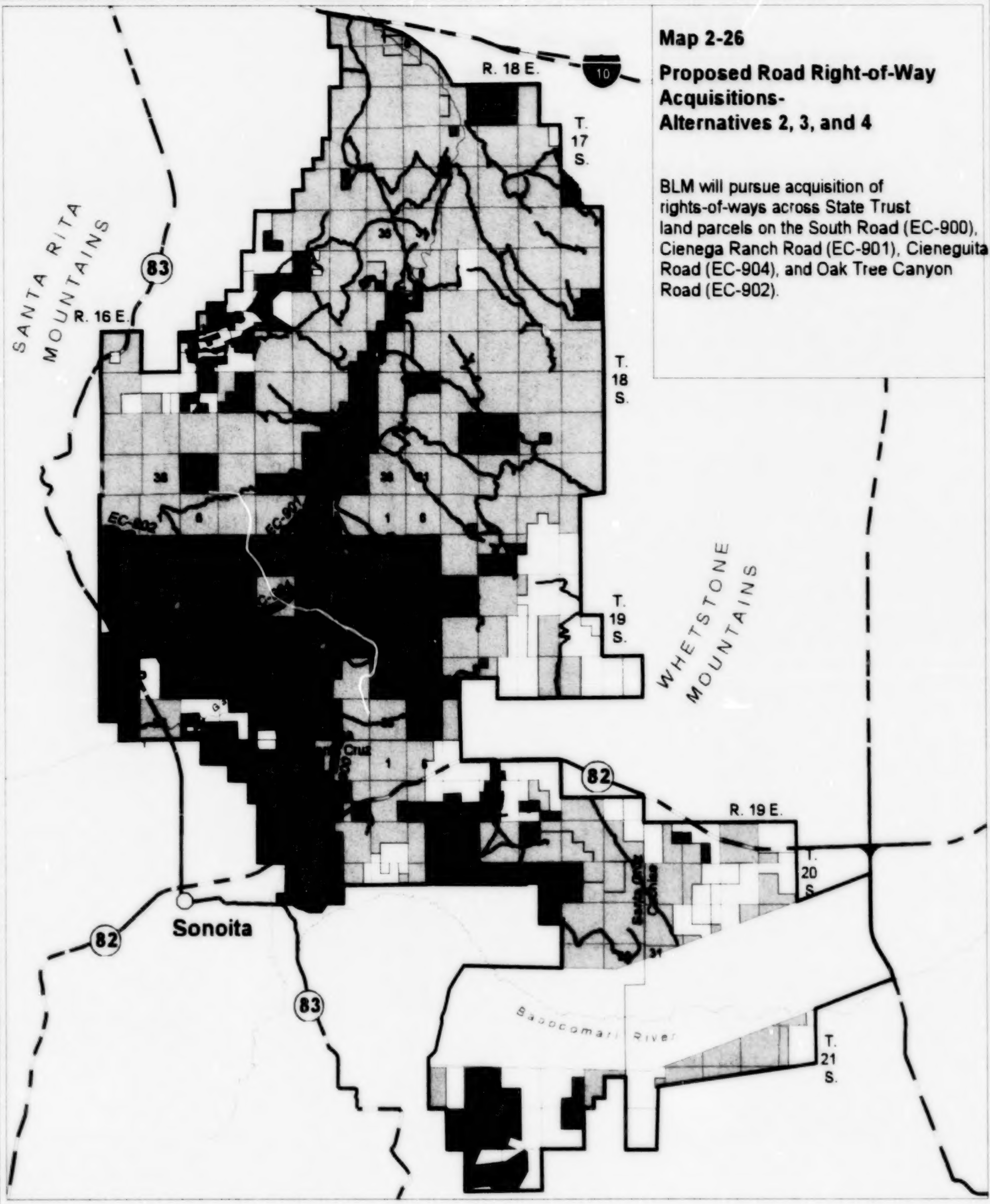
Access and Transportation Management Actions

The following actions are proposed in support of the recreational opportunities objective:

1. BLM will pursue acquisition of perpetual rights-of-ways across State Trust Land parcels on the south entrance road (EC 900), Cienega Ranch Road (EC 901), Cieneguita Road (EC 904), and Oak Tree Canyon Road (EC 902) to ensure continued public access (Map 2-26).

2. BLM may seek additional legal access in the future if warranted by changes in land tenure due to BLM's acquisition of more State Trust or private land.

3. BLM-produced information and interpretive materials will continue to describe access to the Empire-Cienega Planning Area as the Highway 82 and 83 access points. In addition, BLM will call the Oak Tree Canyon entrance a limited access point for off-highway vehicles (OHVs) from the established Forest Service OHV staging area in Oak Tree Canyon. (The crossing under the highway fluctuates from non-motorized access to only small-wheel-base vehicles (ATVs) and motorcycles, depending on flood damage to the culvert.) If issues result from (1) public use of other access points, including resource damage on public lands, (2) user conflicts, or (3) conflicts with surrounding land owners, BLM will take steps to resolve these issues, including education, restrictions, and, as a last resort, closures.



Map 2-26

**Proposed Road Right-of-Way Acquisitions-
Alternatives 2, 3, and 4**

BLM will pursue acquisition of rights-of-ways across State Trust land parcels on the South Road (EC-900), Cienega Ranch Road (EC-901), Cieneguita Road (EC-904), and Oak Tree Canyon Road (EC-902).

**DRAFT
LAS CIENEGAS
RESOURCE MANAGEMENT PLAN**

2 0 2 4 Miles

N

United States Department of the Interior
BUREAU OF LAND MANAGEMENT
TUCSON FIELD OFFICE

LEGEND

— Planning Area Boundary

■ BLM Land

▨ State Land

☐ Private Land

— Existing Road

▬ Proposed ROW Acquisition

May 2001

4. All non-motorized trails will be open to hiking, equestrian, and mountain bike use.

5. On a case-by-case basis, BLM will evaluate future proposals for designation of motorized or non-motorized trails, including the Great Western Trail, for conformity with planning area resource objectives and for conflicts with management prescriptions under the selected alternative. Generally new trail designations will be considered only for existing routes. Proposals for new trail construction would be considered only if the new construction is to replace a segment of trail or road that is being or will be reclaimed.

6. BLM will complete a transportation system project plan for the planning area. The plan will include road numbering, signing, implementing closures and restrictions, and a road maintenance schedule using the Facility Inventory Maintenance Management System (FIMMS) (see Appendix 2).

Recreation Management Actions

The following actions are proposed in support of the recreational opportunities objective:

1. Special Land Use Permit The mixed land ownership pattern within the planning area, and particularly the intermixed BLM and State Trust Lands that are managed under differing mandates, creates recreation management challenges. To improve recreation management and provide for more seamless recreation opportunities, BLM will work with the Arizona State Land Department (ASLD) to pursue acquisition of a special land use permit (SLUP) for State Trust Lands within the planning area to provide public recreation opportunities on these lands Currently, recreationists using State Trust Lands for purposes other than hunting must obtain a permit and pay a fee to the ASLD. Hunters must have a valid license issued by the Arizona Game and Fish Department and be engaged in hunting.

2. Special Recreation Permit System. BLM will analyze the feasibility of implementing a permit system for individual recreational use on the public lands within the planning area. The purpose of the permit system will be to provide a visitor management tool for ensuring the conservation of resources and the continued quality of recreation opportunities, both of which are impacted by increasing levels of human use of the area. The permit system will be developed using a public collaborative process with both fee and non-fee systems examined as options. If a SLUP with the Arizona State Land Department is obtained, then an integrated permit system will be pursued to ensure that the public would need only one permit for the area.

   If the option of a fee program is pursued, it will be under the Land and Water Conservation Fund Act. The Land and Water Conservation Fund Act of 1965 (LWCFA) gives BLM the primary authority to charge fees for use of recreational facilities and public lands, and for Golden Age and Golden Eagle Passports. Until the late1980s, fees collected under this authority were deposited into the LWCFA account, and BLM could not use them for managing recreation sites or programs. In 1988 Congress established a Recreation Operations Subactivity and began to reappropriate funds to BLM on the basis of a previous year's deposit. The funds can now be used for resource protection and for managing recreation sites and programs in the area where the fees originated.

3. Interpretive Program. BLM will develop an interpretive program for the planning area by 2002. Interpretation is a voice for all resource management objectives and programs in this plan. This program will support the overall vision, goals, and objectives of this plan by serving customers, promoting the health of the land, and enhancing the understanding of this area's natural and cultural resources and its management. This program integrates all resource objectives with prescriptions such as placing signs and other information and education products directed to affect visitor behavior. BLM will provide services for people of all abilities by using diverse media and combining techniques to reach different learning styles, abilities, generations, ethnic groups, and cultures. This program will follow the National BLM Interpretive Strategy (BLM 1999) and do the following:

   a. Be thematic and use accepted professional interpretive principles.

   b. Be evaluated to measure effectiveness.

   c. Ensure that each resource message will be displayed effectively and harmonize with objectives for other resource management programs.

   d. Collaborate with other groups such as BLM public affairs; neighboring public and state land managers; outfitters; guides; and cooperating associations, friend's groups, and foundations to provide information to diverse audiences.

   e. Determine the level and suitability of publicity, marketing, brochures, BLM website information, road signs, maps, and priority resource protection messages as they relate to the planning area's management objectives.

   f. Locate and compile basic information on safety and orientation and integrate this information with all resource management objectives and programs, such as recreation opportunities, grazing practices, and creek restoration projects. Methods

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   and styles of communication such as brochures, web pages, signs, and other media selected can be informational, directional, interpretive, or authoritative messages that best minimize impacts to resources and enhance resource protection.

   g. Be led by an interpretive specialist or team. Trained interpretive specialists should develop the details of sign styles and exact text, with input from all resource specialists.

4. Maintenance Program. The recreation program will use BLM's Facility Inventory Maintenance Management System (FIMMS) and integrate with the maintenance needs of other resource objective's to develop a recreation maintenance plan by 2002. Also integrated into FIMMS should be the maintaining of all signs and other infrastructure for motorized and non-motorized travel for all resource programs in this plan amendment. The recreation maintenance plan covers how to manage garbage, camping areas, water sources, barricades, parking areas, fences, trails, roads, and administrative sites. This plan also determines the degree of scheduled and corrective maintenance. Table 2-20 summarizes maintenance prescriptions for roads and recreation sites. Appendix 2 includes detailed descriptions of each maintenance level.

Mineral Resources Management Actions

1. Administrative Use of Mineral Materials. BLM will use mineral materials such as clay, sand, gravel, and boulders for projects within the planning area. BLM expects to use no more than 25,000 cubic yards of mineral materials for any one project. Mineral materials will be used for road repair/maintenance, watershed improvement, and cultural restoration. Mineral materials will be extracted so as to avoid sensitive areas and minimize impacts. BLM will analyze impacts from administrative use of mineral materials on a case-by-case basis.

2. Casual Use of Mineral Materials. Anyone who wishes to remove mineral materials for personal use must obtain a free use permit from the BLM Tucson Field Office. BLM will issue free use permits for up to 1 cubic yard of mineral materials. Permittees will be directed to washes in non-sensitive areas to collect their mineral material.

3. Rockhounding. Rock collectors will follow BLM Arizona guidelines for collecting reasonable amounts of mineral specimens, rocks, petrified wood, invertebrate fossils, and semiprecious gemstones. These guidelines allow collecting specimens for noncommercial personal use, up to 25 pounds per day not to exceed 250 pounds per year.

Alternative 2 Livestock Grazing and Recreation Management Actions

Livestock Grazing Management Actions

Alternative 2 seeks to maximize livestock management responsiveness to changes in the annual vegetation production. Instead of fixed, established stocking rates on the public lands, stocking rates would be set annually in response to changes in total forage production, amount of forage available, and results of monitoring the health of the resource. This management is being practiced voluntarily on the Empire-Cienega allotment through the biological planning process and to some degree on the Empirita allotment.

Table 2-20. Road/Trail Maintenance Guidance by Zone, Empire-Cienega Planning Area

Zone	Range of Maintenance Levels (Fimms)[1]	Maintenance Frequency Range[2]	Range of Trail Types	Range of Road Types
Zone 1 Roaded Natural	Roads: Level 1-4 Trails: Maintenance as needed to maintain tread surface and drainage	1-2	Native tread surface to non-native tread for interpretive trails.	Roads vary from improved single or double lane surfaced with dirt or other native materials or aggregate and subject to moderate maintenance to primitive dirt roads or trails with little or no maintenance.
Zone 2 Natural	Roads: Level 1-3 Trails: Maintenance levels range from minimum needed for obstruction removal or drainage to no maintenance.	1-2	Native tread surface	Roads vary from single lane surfaced with predominantly dirt or other native materials and with aggregate used in spot treatments and subject to infrequent maintenance to primitive dirt roads or trails with little or no maintenance.
Zone 3 Backcountry	Roads: Level 1-3 Trails: Maintenance levels range from minimum needed for obstruction removal or drainage to no maintenance.	generally 0	Native tread surface .	Predominately primitive dirt roads or trails that receive little or no maintenance.

Road Maintenance Levels:

Level 1 - No Maintenance: Roads no longer needed and closed to traffic. Closure devices maintained, drainage stabilized to protect adjacent lands and resource values.

Level 2 - Minimal Maintenance: Roads normally open seasonally or year-round for very low traffic volume. Typically natural surfaced and passable by high-clearance vehicles. Drainage and grade inspected every 3 years and maintained to correct problems.

Level 3 - Maintenance as Needed: Roads open seasonally or year round. Typically natural or aggregate surfaced, but may include low-use bituminous surface, with defined cross- section and drainage. Generally passable by passenger car, but user comfort and convenience are not a high priority. Drainage inspected at least annually and maintained as needed. Grading conducted to provide a reasonable level of riding comfort at prudent speeds. Brushing conducted as needed to improve sight distance.

Level 4 - Annual maintenance. Roads open all year, except may be closed or have limited access seasonally. Typically single or double lane, aggregate, or bituminous surface, with a higher volume of public traffic than administrative traffic. Roadway maintained at least annually, although a preventative maintenance program may be established. Problems repaired as discovered.

[2] Maintenance Frequency
0=no maintenance
1=once a year
2=once in 2 years
3=once in 3 years
4=once in 4 years

As an example of how Alternative 2 would be implemented, Tables 2-21, 2-22, and 2-23 compare three different rates of possible annual production (favorable, normal, and unfavorable years) to the corresponding stocking rate that would be implemented as a result of that year's forage production on each of the allotments. The goal is to quickly respond to annual fluctuations in production by altering the stocking rate and livestock rotation. Actual stocking rates may be higher or lower than those shown in this example depending on evaluation of resource conditions and monitoring data through the biological planning process. Also under Alternative 2, more livestock exclosures would be established to help monitor vegetation responses (Tables 2-15 through 2-19).

Under Alternative 2, the stocking rate would vary with changes in vegetation production. Table 2-24 shows the total vegetation production in favorable, normal, and unfavorable years (based on rainfall) on all lands within each allotment. Also shown is the average amount of forage that livestock could consume on these lands with variable stocking rates. The available forage is assumed to be 50% of the total vegetation produced multiplied by the 35% utilization rate on lands allocated for livestock grazing. The percentage of available forage consumed remains fairly constant under this management strategy.

Highlights of Alternative 2 Livestock Grazing Management Strategies

1. Four livestock operators would continue to lease public lands in the planning area on four individual grazing allotments (Empire-Cienega, Empirita, Rose Tree, Vera Earl). In addition, BLM would establish a livestock grazing allotment in the Empire Mountains.

2. On each allotment a variable stocking rate with a flexible livestock rotation-selective rest-rotation strategy would be implemented. Alternative 2 would establish a variable stocking rate determined annually by an assessment of range conditions, including forage availability and biological monitoring through the biological planning process.

3. On each allotment forage utilization limits would be lowered from current limits as recommended by Holechek and others (1999). Alternative 2 would implement a utilization limit of 30-40% of current year's growth on key perennial grass species and assure that the physiological requirements of plant growth, rest, and reproduction are met for the following key species:
   Perennial Grasses
      plains lovegrass (ERIN)
      sideaots grama (BOCU)
      cane beardgrass (BOBA3)
      vine mesquite (PAOB)
      black grama (BOER4)
      hairy grama (BOHI2)
      sprucetop grama (BOCH)
      plains bristlegrass (SELE2)
      wooly bunchgrass (ELBA)
      green sprangletop (LEDU)
      Arizona cottontop (DICA8)
      crinkleawn (TRMO)
      bush muhly (MUPO2)
      prairie junegrass (KOCR)

4. The biological planning process would be expanded and formalized on the Empire-Cienega allotment, and similar biological planning processes would begin for the other allotments. The biological planning processes will have the following structure:

Biological Planning Process Structure

The key to the variable stocking rate and flexible pasture rotation management approach is (1) to have a variety of options for any planned grazing rotations and (2) to be able to quickly change from the plan when range conditions or livestock needs differ from that expected.

Table 2-21. Variable Grazing Use under Alternative 2, FAVORABLE YEAR[1] Example Las Cienegas Resource Management Plan

Allotment	Total Acres Grazed	Total Production[2] Grazed Acres-Favorable Year (million-lbs)	Total Cows	BLM Acres Grazed	BLM Cows (CYL[3])	ASLD Acres	ASLD Cows	Private Acres	Private Cows
Empire	71,827	129.28	1,496	34,365	716	37,462	780	0	0
Empirita	24,468	29.36	367	1000	15	23,468	352	0	0
Rose Tree	8,469	15.24	176	3,550	74	3,719	77	1,200	25
Vera Earl	1,240	2.16	26	1,240	26	0	na	na	na
Empire Moutains	3,044	3.65	46	2,000	30	0	0	1,044	16
TOTAL	**109,048**	**179.71**	**2,[illegible]**	**42,155**	**861**	**64,649**	**1,209**	**2,244**	**41**

[1] The" favorable, normal, and unfavorable" years mainly reflect rainfall. This variable is used to show that production varies greatly in response to the amount and timing of precipitation, and how different livestock stocking rates affect the amount of vegetation cover remaining to achieve the watershed and wildlife objectives in the plan. In a Favorable Year, the assumed average production is 1800 lbs/ac and 0 .25 AUM/ac on the Empire, Rose Tree, and Vera Earl ranches on the basis of NRCS Ecological Site Guides, and 1200 lbs/ac and .18 AUM/ac on the Empirita and Empire Mountain grazing units. In a Normal Year, the assumed average production is 1200 lbs/ac & 0.15 AUM/ac on the Empire, Rose Tree, and Vera Earl allotments based on NRCS Ecological Site Guides, and 800 lbs/ac and 0.12 AUM/ac on the Empirita and Empire Mountain grazing units. In an Unfavorable Year, the assumed average production is 800 lbs/ac and 0 .10 AUM/ac on the Empire, Rose Tree, and Vera Earl ranches on the basis of NRCS Ecological Site Guides, and 500 lbs/ac and 0.09 AUM/ac on the Empirita and Empire Mountain grazing units.

[2] Total vegetation production comes from the NRCS Ecological Site guides for "favorable, normal, and unfavorable" years, and is provided in the site guides only for reference areas considered to have an excellent similarity correlation to the "Historic Climax Plant Community" for each ecological site. Production encompasses all forms of vegetation production, including trees and shrubs, so cattle never use a certain amount of production. But production still provides a relative index of cover produced. The available forage is assumed to be 50% of the total forage produced multiplied by a 35% utilization rate on lands allocated for livestock grazing.

[3] CYL = cattle year-long

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Table 2-22. Variable Grazing Use under Alternative 2, NORMAL YEAR Example, Las Cienegas Resource Management Plan

Allotment	[redacted]	[redacted]	[redacted]	BLM Acres Grazed	BLM Cows (CYL)	ASLD Acres	ASLD Cows (CYL)	Private Acres	Private Cows (CYL)
Empire	[redacted]	[redacted]	[redacted]	34,365	430	37,462	468	0	0
Empirita	[redacted]	[redacted]	[redacted]	1000	10	23,468	235	0	0
Rose Tree	[redacted]	[redacted]	[redacted]	3,550	44	3,719	47	1,200	15
Vera Earl	[redacted]	[redacted]	[redacted]	1,240	16	0	na	na	na
Empire Mountains	[redacted]	[redacted]	[redacted]	2,000	20	0	0	1,044	10
TOTAL	[redacted]	[redacted]	[redacted]	**42,155**	**520**	**64,649**	**750**	**2,244**	**25**

Table 2-23. Variable Grazing Use under Alternative 2, UNFAVORABLE YEAR Example, Las Cienegas Resource Management Plan

Allotment	[redacted]	[redacted]	[redacted]	BLM Acres Grazed	BLM Cows (CYL)	ASLD Acres	ASLD Cows	Private Acres	Private Cows
Empire	[redacted]	[redacted]	[redacted]	34,365	286	37,462	312	0	0
Empirita	[redacted]	[redacted]	[redacted]	1000	8	23,468	176	0	0
Rose Tree	[redacted]	[redacted]	[redacted]	3,550	30	3,719	31	1,200	10
Vera Earl	[redacted]	[redacted]	[redacted]	1,240	10	0	0	na	na
Empire Mountains	[redacted]	[redacted]	[redacted]	2,000	15	0	0	1,044	8
TOTAL	[redacted]	[redacted]	[redacted]	**42,155**	**349**	**64,649**	**519**	**2,244**	**18**

Table 2-24. Comparison of Vegetation Production under Three Rainfall Regimes and Forage Consumption by Livestock under Alternative 2 Livestock Management, Las Cienegas Resource Management Plan

	[redacted]	[redacted]	[redacted]	**Production Consumed By Total Cows (Million-lbs)**	**% Total Production Consumed**	**Available Forage (million-lbs)**	**% Available Forage Consumed**
Favorable Year	[redacted]	[redacted]	[redacted]	20.26	11	31.45	64
Normal Year	[redacted]	[redacted]	[redacted]	12.43	10	20.97	60
Unfavorable Year	[redacted]	[redacted]	[redacted]	8.52	10	13.82	62

Components

Biological Planning Team. This team consists of a balance between resource managers, resource users, and those concerned with the resource's proper management. Participants include representatives of the following:

a. Land ownership (BLM, Arizona State Land Department, U.S. Forest Service, Audubon Society, private owners, and the Natural Resources Conservation Service).

b. Permitted uses (grazing lessees, recreation groups).

c. Research efforts (USDA Agricultural Research Service, University of Arizona, Arizona State University).

d. Wildlife management needs and concerns (Arizona Game and Fish Dept., U.S. Fish and Wildlife Service).

e. Environmental interests and public concerns.

Actions. The team will meet at least twice a year (in March or April before the spring growing season and in September following the monsoon rains) to do the following:

a. Determine the current health and trend of the resource.

b. Evaluate monitoring data.
   precipitation
   rangeland ecological site (range) condition
   riparian and aquatic condition
   vegetation trends
   vegetation utilization
   soil cover
   wildlife populations and habitats
   livestock pasture use records
   livestock pasture recovery (new production)
   recreation post-use reports

c. Evaluate proposed grazing and recreation actions in light of the objectives in this plan and current resource conditions or concerns.

d. Recommend decisions to management on the following:

   Annually authorize livestock grazing (conditions incorporated in grazing bill on numbers, pasture and water use, and rotation).

   Change recreation authorizations or site uses.

5. The interim grazing plan for the Empire-Cienega allotment (BLM 1995) and the Coordinated Grazing Management Plan for the Empirita allotment would be modified to incorporate the goals, objectives, and actions in this plan. BLM would develop grazing management plans for the Rose Tree, Vera Earl, and Empire Mountains allotments.

6. BLM would develop more exclosures on allotments and monitor these non-grazed lands to determine the effects of grazing and rest on habitats and would authorize livestock grazing in these riparian pastures and exclosures only to meet a resource objective.

Empire-Cienega Allotment (#6090)-Alternative 2 Proposed Management

Summary of RMP-Level Proposal

Under Alternative 2, BLM would allocate livestock forage on 34,365 acres of public land within the Empire-Cienega allotment (# 6090) and would continue to sublease livestock grazing on the 37,462 acres of State Trust Lands leased to BLM. About 2,319 acres (6%) of the BLM lands would be excluded from livestock grazing as vegetation study areas.

Activity Plan Proposal

Under Alternative 2, BLM would manage the Empire-Cienega Planning Area almost the same as it does now: a variable stocking rate with flexible livestock rotation-selective rest-rotation strategy. The main difference is that no livestock numbers would be established through a long-term lease agreement. Numbers would be established annually in response to rangeland health, through the Biological Planning Process. In addition, the proposed management would exclude more acreage from livestock grazing and would emphasize monitoring both grazed and non-grazed lands to determine the effects of grazing and rest on habitats. The biological planning process would still be the key. BLM would annually allocate livestock forage in response to the health of the resource, as determined by the assessment and evaluation of the monitoring data by the Biological Planning Team.

Summary of Empire-Cienega Grazing Management

1. Establish a formal process through the Biological Planning Team to determine the annual authorized use (which has averaged 1,037 cattle year-long (range of 662-1436) on the entire allotment at 49% public land use). Licensed use would be based on the number of cattle year-long on the entire allotment at 48% BLM public land use.

2. Modify the biological planning process as described above. Expand the process to include wildlife, grazing, and recreation issues. Modify the current interim grazing management plan to incorporate these changes.

3. Modify the current interim grazing management plan to incorporate flexible stocking rates determined annually by an assessment of range conditions and biological monitoring through the modified biological planning process. Alternative 2 would also develop the range improvement projects proposed for Alternative 1.

4. Modify the current interim grazing management plan to reduce utilization to 30-40% of current year's growth on key perennial grasses as described in the Alternative 2 summary.

5. Modify the current interim grazing plan to establish study exclosures on the 2,319 acres of public lands not allocated to livestock grazing. Monitor these non-grazed lands to determine the effects of grazing and rest on habitats.

6. Continue to implement the following measures to protect populations of Gila topminnow and topminnow habitat from grazing impacts:

   a. Limit livestock use in riparian areas of Cienega Creek, Mattie Canyon, and Empire Gulch with perennial water to the crossing lanes and watering areas listed in Table 2-25 and areas where BLM through the biological planning process determines a need to use livestock grazing as a management tool to meet a riparian or aquatic-related resource objective.

   b. Rotate use of crossing lanes and move cattle through them within 21 days.

   c. Phase out water gaps in areas where adjacent upland waters are developed.

   d. Inspect and maintain riparian exclosure fences at least twice annually.

   e. Locate all new repressos (earthen stock ponds) to minimize the likelihood of floods or humans moving exotic fish and bullfrogs into topminnow habitat.

   f. Use repressos only when required to water cattle and allow repressos to dry when no longer needed to water cattle. Drain repressos if they do not dry annually.

   g. Monitor the fish community and habitat, including crossing lanes, grazed riparian zones, and repressos, to document the level of incidental take and to check for introduction of exotic fish and bullfrogs.

   h. Develop mitigation plans in coordination with the Fish and Wildlife Service for range improvements and vegetation treatments which may harm the topminnow or its habitat.

Table 2-25. Livestock Crossing Lanes and Watering Areas, Empire-Cienega Allotment

Crossing Lane	Legal Location	Pasture
Headwaters	T.19S, R.17E, Sect. 15	5 wire, Hilton sacaton
Gardner	T. 19S, R. 17E, Sect. 10	500 acre, 5 wire
EC900 Road Crossing (hardened)	T. 18S, R. 17E, Sect. 35	Mac's sacaton, North
Sam's	T. 18S, R. 17E, Sect 26	North, Ag. Fields
49 Lane	T. 18S, R. 17E, Sect. 26	Mac's sacaton, Lower 49
Fresno	T. 18S, R. 17E, Sect. 23	Fresno, 49, Rockhouse
Dominguez	T. 18S, R. 17E, Sect. 13	Rockhouse, Fresno
Narrows	T. 18S, R. 18E, Sect. 3	Rockhouse, A3, Apache

7. Continue to implement the following measures to protect the southwestern willow flycatcher and its habitat from grazing impacts:

    a. Exclude livestock grazing from occupied or unsurveyed, suitable habitat during the southwestern willow flycatcher breeding season (April 1-September 1) with the exception of crossing lanes.

    b. Do not authorize livestock management activities, including development of range improvements, in the riparian zone of unsurveyed, suitable or occupied willow flycatcher habitat during the willow flycatcher breeding season.

    c. Locate any new livestock management facilities likely to attract and support cowbirds more than 5 miles from occupied, suitable, or potential flycatcher habitat unless such facilities are crucial to protecting riparian habitat, and cowbird trapping is implemented to counteract the effect of the facility.

8. Adjust livestock grazing rotation and utilization and develop more fencing as needed to meet watershed cover required in the upland vegetation objective.

9. Adjust livestock grazing rotation and utilization and develop more fencing as needed to leave enough cover after the summer livestock rotation to meet cover needs for antelope fawning as described in the pronghorn habitat objective (Upland Wildlife Habitat Subobjective B).

10. Adjust grazing rotation by developing a North-South Hilton pasture fence to ensure adequate cover for grassland sparrows as defined in the grassland sparrow subobjective (Upland Wildlife Habitat Subobjective A).

Empirita Allotment (#6210) - Alternative 2 Proposed Management

Summary of RMP Proposal

Under Alternative 2, BLM would allocate livestock grazing forage on 1,000 of the 1,520 acres of public lands and continue to sublease the 23,468 acres of State Trust lands under grazing lease (05-437) to the Parsons Company. A total of 520 acres (34%) of public lands within the Empirita allotment (#6210) would be excluded from grazing to study the effects of grazing.

Summary of Empirita Grazing Management

1. Change the grazing strategy to a variable stocking rate with a flexible livestock rotation-selective rest-rotation strategy.

2. Establish a formal process through the Biological Planning Team to determine the annual authorized use (that has averaged 80 to 337 cattle year-long on the entire allotment at 3% public land use).

3. Implement the biological planning process on the Empirita allotment as described above. Allocate livestock forage yearly in response to the health and productivity of the resource, as determined by the Biological Planning Team's evaluation of the monitoring data. This stocking rate would be determined annually by assessing range conditions and biological monitoring through the biological planning process. Flexible rotation is based on current resource conditions and objectives and uses the biological planning process to provide input into seasonal decision making.

4. Modify the grazing management plan to incorporate flexible stocking rates, the biological planning process, and the building of fencing and water developments to develop riparian pastures at the Narrows and around

Nogales Spring. The other range improvements proposed for Alternative 1 would also be developed under Alternative 2.

5. Modify the grazing management plan to reduce utilization to 30-40% of current year's growth on key perennial grass species as described in the Alternative 2 summary above.

6. Establish study exclosures on the 520 acres of public lands not allocated to livestock grazing. Monitor these non-grazed lands to determine the effects of grazing and rest on habitats.

7. Implement the following measures to protect Gila topminnow and topminnow habitat from grazing impacts:

   a. Limit livestock use in riparian areas of Cienega Creek and Nogales Springs with perennial water to the Narrows crossing lane and watering area (T. 18S, R. 18E, Sect. 3) and areas where BLM through the biological planning process determines a need to use livestock grazing as a management tool to meet a riparian or aquatic-related resource objective.

   b. Rotate use of crossing lanes and move cattle through them within 21 days.

   c. Phase out water gaps in areas where adjacent upland waters are developed.

   d. Inspect and maintain riparian exclosure fences at least twice annually.

   e. Locate all new repressos (earthen stock ponds) to minimize the likelihood of floods or humans moving exotic fish and bullfrogs into topminnow habitat.

   f. Use repressos only when required to water cattle, and allow repressos to dry when no longer needed to water cattle. Drain repressos if they do not dry annually.

   g. Monitor the fish community and habitat including crossing lanes, grazed riparian zones, and repressos to document the level of incidental take and to check for introduction of exotic fish and bullfrogs.

   h. Develop mitigation plans in coordination with the Fish and Wildlife Service for range improvements and vegetation treatments that may harm the topminnow or its habitat.

8. Continue to implement the following measures to protect the southwestern willow flycatcher and its habitat from grazing impacts:

   a. Exclude livestock grazing from occupied or unsurveyed, suitable habitat during the southwestern willow flycatcher breeding season (April 1-September 1) except for crossing lanes.

   b. Do not authorize livestock management activities, including development of range improvements, in the riparian zone of unsurveyed, suitable or occupied willow flycatcher habitat during the willow flycatcher breeding season.

   c. Locate any new livestock management facilities likely to attract and support cowbirds more than 5 miles from occupied, suitable, or potential flycatcher habitat unless such facilities are crucial to protecting riparian habitat, and cowbird trapping is implemented to counteract the effect of the facility.

Rose Tree Allotment (#6043) - Alternative 2 Proposed Management

Summary of RMP-Level Proposal

Under Alternative 2 BLM would allocate livestock grazing forage on 3,550 acres of the 3,950 acres of public lands within the Rose Tree allotment (#6043), and exclude 400 acres (7%) from livestock grazing to study the effects of grazing. The allotment also includes 3,719 acres of State Trust lands and 1200 acres of private lands, which the livestock operator would continue to for grazing.

Summary of Rose Tree Grazing Management

1. Change the grazing strategy to a variable stocking rate with a flexible livestock rotation-selective rest-rotation strategy.

2. Establish a formal process through the Biological Planning Team to determine the annual authorized use, (that has varied from 100-200 animal units on a year-long basis). Licensed use would be based on the number of cattle year-long on the entire allotment at 42% BLM public land use.

3. Implement the biological planning process on the Rose Tree allotment as described above. Allocate livestock forage yearly in response to the health and productivity of the resource, as determined by the Biological Planning Team's evaluation of the monitoring data. The team would determine stocking rates annually by assessing range conditions and biological monitoring through the biological planning process. Flexible rotation is based on current resource conditions and objectives and uses the biological planning process to provide input into seasonal decision making.

4. Conduct an ecological site inventory to evaluate current vegetation conditions to compare to the upland vegetation objective.

5. Develop a grazing management plan that incorporates flexible stocking rates, the biological planning process, and any other range improvements needed to meet resource objectives.

6. Reduce the utilization limit to 30-40% of current year's growth on key perennial grass species as described in the Alternative 2 summary above.

7. Adjust livestock grazing rotation and utilization and develop more fencing as needed to achieve watershed cover required in the upland vegetation objective.

8. Adjust livestock grazing rotation and utilization and develop more fencing as needed to leave enough cover after the summer livestock rotation to meet cover needs for antelope fawning as described in the pronghorn habitat objective (Upland Wildlife Habitat Subobjective B) and to ensure adequate cover for grassland sparrows as defined in the grassland sparrow subobjective (Upland Wildlife Habitat Subobjective A).

9. Establish study exclosures on the 400 acres of public lands not allocated to livestock grazing. Monitor these non-grazed lands to determine the effects of grazing and rest on habitats.

Vera Earl Allotment (#6129) - Alternative 2 Proposed Management

Summary of RMP-Level Proposal

Under Alternative 2 BLM would allocate livestock grazing forage on 1,240 acres of the 1,440 acres of public lands on the Vera Earl allotment (#6129) and exclude 200 acres (14%) from livestock grazing.

Summary of Vera-Earl Grazing Management

1. Change the grazing strategy to a variable stocking rate with a flexible livestock rotation-selective rest-rotation strategy.

2. Establish a formal process through the Biological Planning Team to determine the annual authorized use (that has been 27 animal units on a year-long basis on the BLM portion of the allotment only-100% BLM). Licensed use would be based on the number of cattle year-long on the entire allotment at 5% BLM public land use.

3. If the operator chose, licensed use could also be based on the number of cattle year-long on the entire allotment at 10% BLM public land use. The current stocking rate is 27 CYL on the BLM portion of the allotment (100% public land use). On the entire allotment the authorized use is about 282 CYL at 10% public land use = 338 AUMs. The other lands include USFS and about 6,000 acres of private lands owned by the estate of Bettie A. Beck.

4. Implement the biological planning process on the Vera Earl allotment as described above. Allocate livestock forage yearly in response to the health and productivity of the resource, as determined by the Biological Planning Team's evaluation of the monitoring data. The team would determine this stocking rate by assessing range conditions and biological monitoring through the biological planning process. The flexible rotation is based on current resource conditions and objectives and uses the biological planning process to provide input into seasonal decision making.

5. Conduct an ecological site inventory to evaluate current vegetation conditions to compare to the upland vegetation objective.

6. Develop a grazing management plan that incorporates flexible stocking rates, the biological planning process, and any other range improvements needed to meet resource objectives.

7. Reduce the utilization limit to 30-40% of current year's growth on key perennial grass species as described in the Alternative 2 summary above.

8. Adjust livestock grazing rotation and utilization and develop more fencing as needed to achieve watershed cover required by the upland vegetation objective.

9. Adjust livestock grazing rotation and utilization and develop more fencing as needed to leave enough cover after the summer livestock rotation to meet cover needs for antelope fawning as described in the pronghorn habitat objective (Upland Wildlife Habitat Subobjective B) and to ensure adequate cover for grassland sparrows as defined in the grassland sparrow subobjective (Upland Wildlife Habitat Sub-Objective A).

10. Establish study exclosures on the 200 acres of public lands not allocated to livestock grazing. Monitor these non-grazed lands to determine the effects of grazing and rest on habitats.

Empire Mountains Allotment - Alternative 2 Proposed Management

Summary of RMP-Level Proposal

Under Alternative 2 BLM would allocate livestock grazing forage on 2,000 acres of the 2,480 acres of public lands in the Empire Mountains and include 480 acres in livestock exclosures. A new grazing allotment would be created. The grazing allotment could also include about 4,000 acres of private lands leased by the grazing operator for grazing.

Empire Mountains Grazing Management

1. Conduct an ecological site inventory to evaluate current vegetation conditions to compare to the upland vegetation objective and to help establish an initial stocking rate.

2. Develop a community-based grazing management plan that incorporates flexible stocking rates and rotation, the biological planning process, and any range improvements needed to meet resource objectives and manage livestock.

3. Build any needed range improvements and complete the plan with community approval before stocking any livestock on allotment.

4. Establish a Biological Planning Team and a formal process through this team to determine annual authorized use.

5. Establish a utilization limit of 30-40% of current year's growth on key perennial grass species as described in the Alternative 2 summary above.

6. Establish study exclosures on the 400 acres of public land not allocated to livestock grazing. Monitor these non-grazed lands to determine the effects of grazing and rest on habitats.

Recreation Management

Non-Motorized Trails

Under Alternative 2, designation of an additional non-motorized loop trail is proposed in North and Oak Tree canyons (Map 2-27). The trail begins and ends at the Air Strip day use area. The proposed trail route crosses about 3 miles of public land and also crosses several miles of State Trust and Forest Service lands. The route for the return segment of the trail (about 1.5 miles) will be coordinated with the route for the Oak Tree Canyon portion of the Arizona Trail so as to not duplicate trails in this area. For the trail to be implemented, a right-of-way must be obtained from the Arizona State Land Department and approval for the trail location and development on Forest Service lands would also need to be obtained. The Southern Arizona Mountain Bike Association (SAMBA) proposed the route and has expressed interest in pursuing the right-of-way and necessary approvals for development.

Management within Recreation Zones

Managing visitor use impacts within recreation zones is an important part of maintaining the quality of the desired recreation opportunity settings included in the resource management plan (RMP) level proposals. Table 2-26 summarizes the management prescriptions for each recreation zone (Maps 2-7, 2-14, and 2-19). BLM would apply these prescriptions regardless of the different zone configurations under different alternatives. In addition to these prescriptions, BLM is proposing a step-down approach to managing visitor use impacts.

The first step would be to begin or increase visitor awareness or education. This more light-handed approach may in many instances be enough to reverse downward trends in resource conditions, including the decline in quality of recreational settings. Visitor education would incorporate existing national programs such as Leave No Trace and Tread Lightly. An important part of the education and awareness step would be to develop partnerships with user groups to help with education and visitor awareness. If education is unsuccessful, BLM might apply more heavy-handed approaches to reverse downward trends. Such approaches might include restrictions and regulations. BLM could also use partnerships to help with monitoring and rehabilitation.

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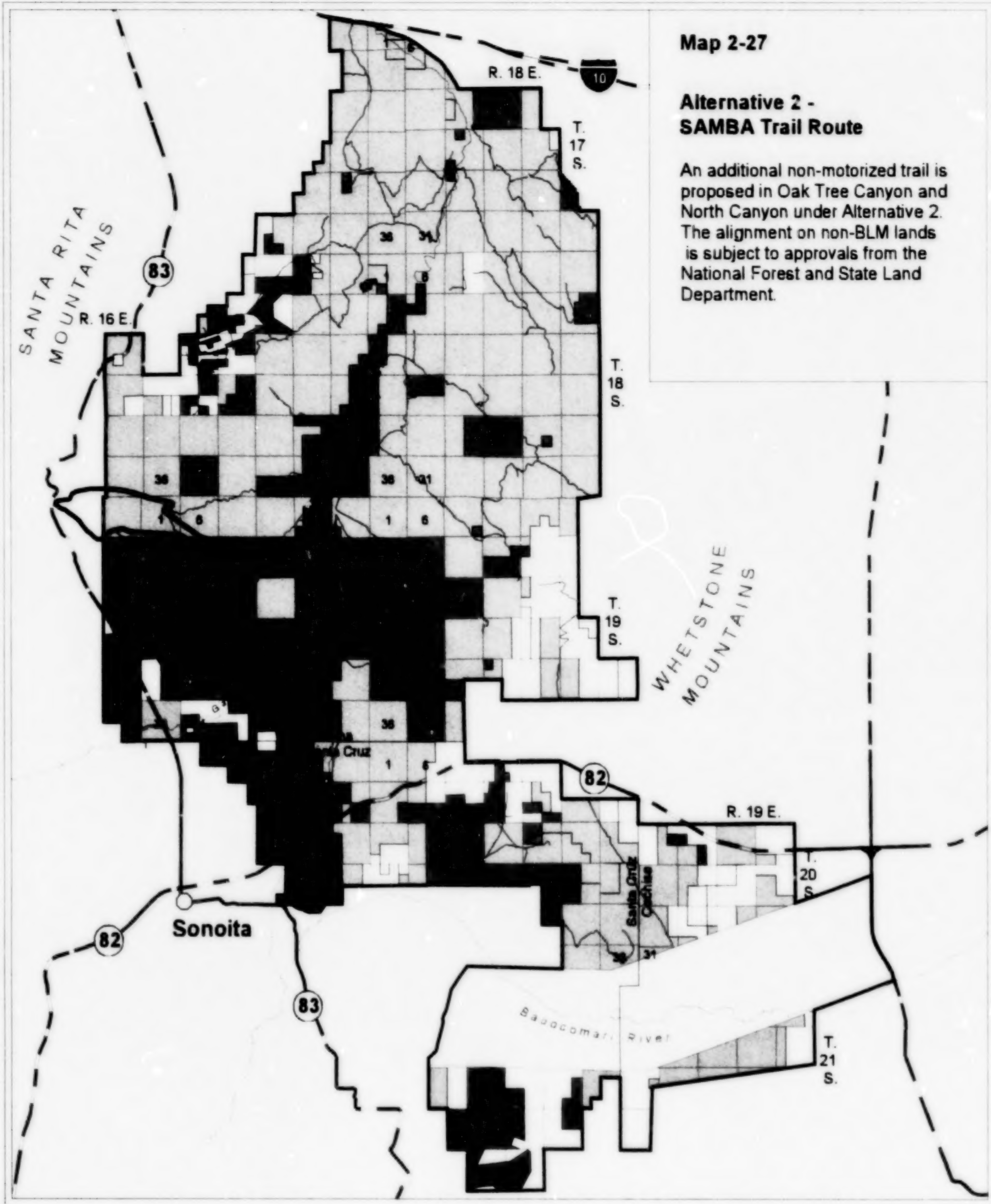

Map 2-27

Alternative 2 -
SAMBA Trail Route

An additional non-motorized trail is proposed in Oak Tree Canyon and North Canyon under Alternative 2. The alignment on non-BLM lands is subject to approvals from the National Forest and State Land Department.

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LEGEND
— Planning Area Boundary
■ BLM Land
▨ State Land
☐ Private Land
— Existing Road
- - - Arizona Trail Route
— SAMBATrail Route

May 2001

Table 2-26. Recreation Management Zones, Empire-Cienega Planning Area

Factors Influencing Recreation Experience Opportunities	**ZONE 0 Rural**	**ZONE 1 Roaded Natural**	**ZONE 2 Natural**	**ZONE 3 Backcountry Semi-Primitive**	**ZONE 4 Primitive/Wilderness**
Zone Descriptions	Zone 0 consists of the developed communities in the Sonoita Valley offering small-town amenities and activities.	Zone 1 offers easy access with some interpretive and educational facilities. It generally consists of day use with no public camping. Motorized traffic is directed to use designated parking, pullouts and loop drive. Zone Highlights: * Sight seeing Drive * High visitor concentration * No Camping	Zone 2 offers moderate access with infrequent road maintenance and designated camping, parking, and pullouts Zone Highlights: * Sight seeing drive * Medium visitor concentration. * Designated camping	Zone 3 offers a low concentration of visitors, predominantly natural environment. Minimum onsite controls are present but subtle. Zone has limited signage and dispersed recreation opportunities. Zone Highlights: *Low visitor concentration *Dispersed camping	Zone 4 offers a high solitude experience with low interaction among visitors. Restrictions and controls not evident after entry (Santa Ritas, Whetstone (not BLM) Zone highlights: * Low visitor concentration * Non-motorized travel *Dispersed backpack camping
1. Difficulty Rating	Elementary	Elementary	Easy	Difficult	Advanced
2. Vehicle Recommendations	▸ All types	▸ RV ▸ Sedan ▸ Van ▸ No clearance requirements ▸ Touring motorcycle ▸ Mountain bike ▸ Horse trailers	▸ Sedan (on selected roads during good weather) ▸ Sport utility vehicle ▸ Moderate clearance needed ▸ Touring motorcycle ▸ Mountain bike ▸ Horse trailers	▸ 2WD in most areas ▸ High clearance needed ▸ 4WD/ATV in some areas ▸ Enduro/dirt motorcycle ▸ Mountain bike ▸ Horse trailers	▸ Generally non-motorized ▸ 4WD/ATV in some areas (limited access) ▸ Dirt motorcycle (limited access) ▸ Mountain bike/limited access)

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Table 2-26, continued. Recreation Management Zones, Empire-Cienega Planning Area

Factors Influencing Recreation Experience Opportunities	ZONE 0 Rural	ZONE 1 Roaded Natural	ZONE 2 Natural	ZONE 3 Backcountry Semi-Primitive	ZONE 4 Primitive/Wilderness
3. Primary Recreational Activities	▸ Small town amenities ▸ Sightseeing ▸ Wine tasting ▸ Scenic tours ▸ Town activities	▸ Sightseeing ▸ Visiting historic sites ▸ Photography ▸ Camping ▸ Day use	▸ Sightseeing ▸ Camping ▸ Visiting historic sites ▸ Viewing wildlife ▸ Photography ▸ Driving for pleasure ▸ Picnicking ▸ Hunting ▸ Equestrian activities ▸ Mountain biking	▸ Sightseeing ▸ Camping ▸ Visiting historic sites ▸ Viewing wildlife ▸ Photography ▸ Driving for pleasure, picnicking ▸ Hunting ▸ Hiking ▸ Backpacking ▸ Solitude ▸ Equestrian activities ▸ Mountain biking	▸ Sightseeing ▸ Camping ▸ Viewing wildlife ▸ Photography ▸ Hunting ▸ Hiking ▸ Backpacking ▸ Solitude ▸ Equestrian activities
4. Time Investment	▸ 1 hour to ¾ day	▸ 1 hour to ½ day	▸ ½ day to 1 day	▸ 1 or more days	▸ 1 or more days
5. Degree of Solitude	▸ Low	▸ Low	▸ Moderate	▸ Excellent	▸ Outstanding
6. Map Reading Skills Needed	▸ Low	▸ Low	▸ Moderate	▸ Moderate/High	▸ High
7. Survival Skills Needed	▸ Little	▸ Little	▸ Some	▸ Moderate	▸ High
8. Likelihood of Getting Lost if Unprepared	▸ Little	▸ Little	▸ Slight	▸ Moderate	▸ High
9. Likelihood of Getting Help if Stranded	▸ Very High	▸ High	▸ Moderate	▸ Low	▸ Very Low
10. Probable Waiting Time for First Contact with Another Party	▸ Less than 30 minutes	▸ 30 minutes	▸ 30 minutes to 1 hour	▸ Several hours to several days	▸ Several hours to several days

Table 2-26, continued. Recreation Management Zones, Empire-Cienega Planning Area

Factors Influencing Recreation Experience Opportunities	ZONE 0 Rural	ZONE 1 Roaded Natural	ZONE 2 Natural	ZONE 3 Backcountry Semi-Primitive	ZONE 4 Primitive/Wilderness
11. Probable Waiting Time for Summoned Help to Arrive	▸ Less than 30 minutes	▸ 1 hour	▸ 2 hours	▸ 4-6 hours	▸ 6 + hours
12. Availability of Drinking Water	▸ Yes	▸ Yes	▸ No	▸ No	▸ No
13. Availability of Gasoline	▸ Yes	▸ No	▸ No	▸ No	▸ No
14. Accommodations (motel, hookups)	▸ Yes	▸ No	▸ No	▸ No	▸ No
15. Groceries, eating places	▸ Yes	▸ No	▸ No	▸ No	▸ No
16. Typical Road Type	▸ County maintained roads, paved.	▸ Improved gravel or dirt: frequent, moderate to high maintenance	▸ Improved gravel or dirt, infrequent, low maintenance	▸ Unmaintained or not present	▸ Unmaintained or not present
17. Range of Typical Road Types	▸ Good	▸ Good to muddy/impassable	▸ Good to muddy/impassable	▸ Fair to impassable	▸ No roads to very poor
18. Level of Informational, Directional, or Interpretive Signage	▸ Abundant	▸ Abundant	▸ Frequent	▸ Occasional	▸ Rare
19. Available BLM Informational Flyers, Brochures, Etc.	▸ Some	▸ Abundant	▸ Some	▸ Few	▸ Rare
20. Visitor Centers, Interpretive Sites	▸ Some	▸ Yes	▸ Some	▸ No	▸ No

Table 2-26, continued. Recreation Management Zones, Empire-Cienega Planning Area

Factors Influencing Recreation Experience Opportunities	ZONE 0 Rural	ZONE 1 Roaded Natural	ZONE 2 Natural	ZONE 3 Backcountry Semi-Primitive	ZONE 4 Primitive/Wilderness
21. Designated Picnic Areas	▸ Yes	▸ Yes	▸ Yes	▸ Yes	▸ No
22. Designated Camping, Areas	▸ Yes	▸ No	▸ Yes	▸ Yes	▸ No
23. Dispersed Camping	▸ No	▸ No	▸ Yes	▸ Yes	▸ Yes
24. Group Sites	▸ Yes	▸ Yes ▸ Seasonal	▸ Yes ▸ Seasonal	▸ Yes ▸ Seasonal	▸ No
25. Designated Pullouts	▸ Yes	▸ Yes	▸ Few	▸ Few	▸ No

Management of Designated Recreation Sites

The following are general management prescriptions for each type of designated recreation site. These prescriptions are common to Alternatives 2, 3, and 4.

Designated Group Sites

Group sites are open for group use only on a reservation basis and under a special recreation permit. Group sites will generally **not** be open to use by individuals if not reserved by a group. BLM will determine the capacity of a group site and length of a single event at such a site, depending on the type of activity and resource concerns. Special stipulations will be attached to group activities at these sites through the special recreation permit process. BLM may seasonally or temporarily close group sites in response to resource conditions or other concerns. Any improvements or developments at the sites must conform to the overall management prescription for the zone in which the site occurs. Permit holders may bring in portable improvements but must remove these at the close of the event. BLM would monitor impacts from group sites to determine if it needs to adjust the site management.

Designated Camp Areas

The designated camping areas would all have similar management prescriptions. These areas would be open for individual but not group use (groups are defined as more than 29 people). The capacity of each camping area is expected to be less than 30 people. The most vehicles allowed on each individual site within the camping area would vary, depending on the site. Some sites would be limited to one vehicle. Other sites would be suitable for four to five vehicles. BLM would restrict the type of activity to camping and limit proposed development in each camping area to posting site numbers, erecting barriers of natural materials, if needed, and placing signs, which would be kept to a minimum. BLM proposes no other development and may seasonally close any of these sites in response to resource conditions. The Road Canyon site would be closed during antelope fawning season (April-June).

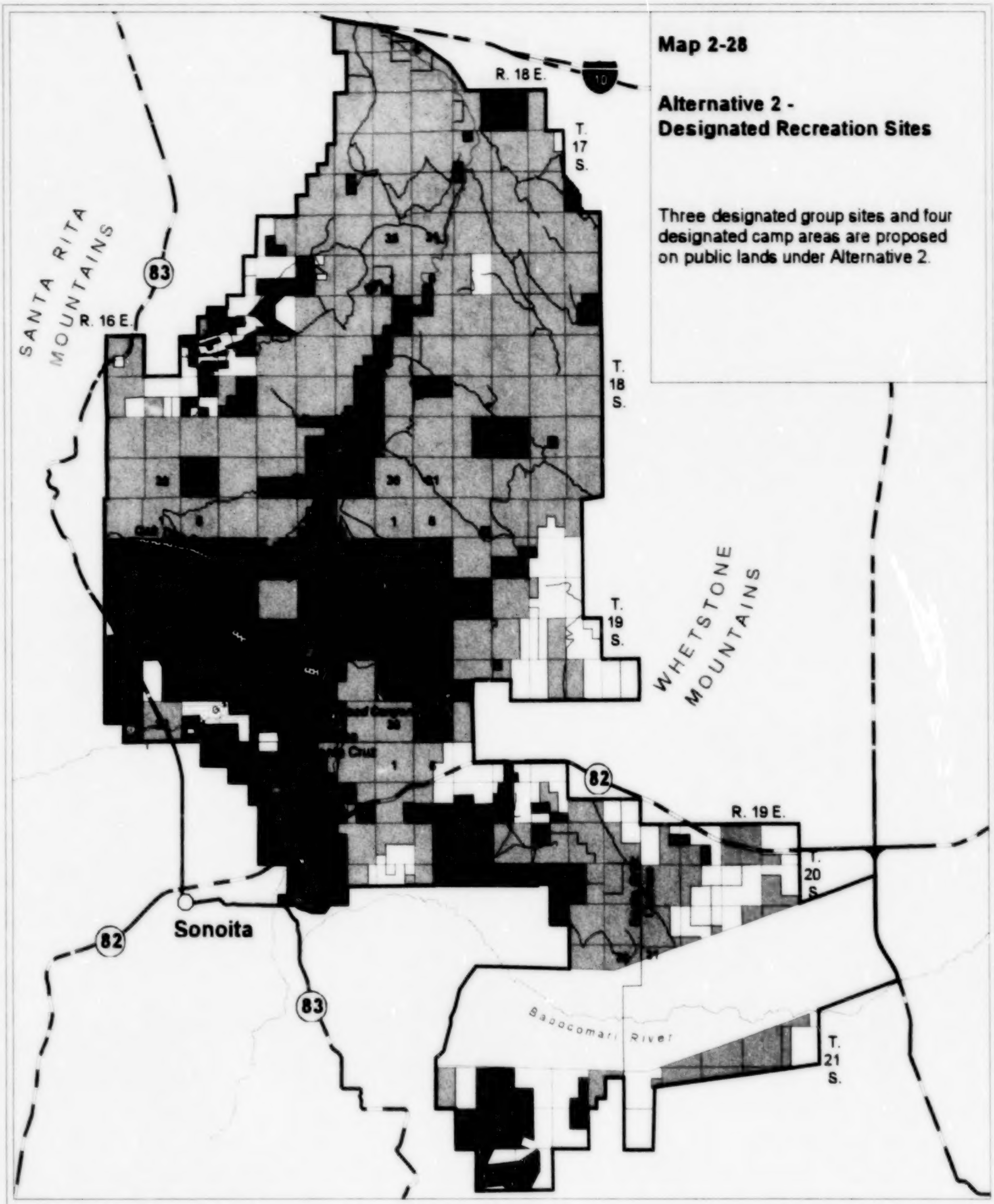
The Oak Tree designated camping area has a few special stipulations. Proposed development of this area would consist of creating designated camping sites and parking spots that would prevent people from parking under oak trees. To deter campers from building fires under the oaks, BLM would establish fire rings away from the trees and erect vehicle barriers. BLM would also post educational signs to inform visitors about oak tree ecology and how parked cars and campfires harm the oaks.

Pullouts

Pullouts will consist of widened areas along roadways. They will be marked, if necessary, with signing and barriers of natural materials. The pullouts will be designed for vehicles to turn around in or for three to five vehicles to park in. Camping will not be permitted at pullouts.

Alternative 2 Designated Recreation Sites

Under Alternative 2, BLM would establish three designated group sites (Maternity Well, Air Strip, and Agricultural Fields), four designated camp areas (Oak Tree, Cieneguita, Oil Well, and Road Canyon), and at least 11 pullouts (Map 2-28). Table 2-27 compares the activity plan proposals for recreation among the alternatives.



Map 2-28

Alternative 2 -
Designated Recreation Sites

Three designated group sites and four designated camp areas are proposed on public lands under Alternative 2.

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LEGEND
— Planning Area Boundary
■ BLM Land
▨ State Land
☐ Private Land
■ Designated Group Site
▩ Designated Camp Area

May 2001

Table 2-27. Comparison of Recreation Alternatives—Activity Plan Level, Las Cienegas Resource Management Plan

Activity Issue	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4
Designated Group Sites	None	3–Maternity Well, Air Strip, Agricultural Fields	5–Maternity Well, Air Strip, Agricultural Fields, Road Canyon, Hilton	1–Air Strip
Designated Camp Areas	None	4–Oak Tree, Cieneguita, Oil Well, Road Canyon	5–Oak Tree, Agricultural Fields, Cieneguita, Oil Well, Road Canyon	4–Oak Tree, Cieneguita, Oil Well, Road Canyon
Day Use Areas	None	2–Empire Gulch, west 1/4 of Air Strip	2–Empire Gulch, west 1/4 of Air Strip	1–Empire Gulch
Designated Pullouts	None	2–(Kiosk and Ranch HQ) from Hwy 83 east to Ranch HQ.	2–(Kiosk and Ranch HQ) from Hwy 83 east to Ranch HQ.	2–(Kiosk and Ranch HQ) from Hwy 83 east to Ranch HQ.
Note: These are the minimum number of pullouts and approximate locations; others may be proposed and site locations may be adjusted after site reviews.		4–from Ranch HQ south to Oil Well on South Road Loop Rd.	4–from Ranch HQ south to Oil Well on South Road Loop Rd.	4–from Ranch HQ south to Oil Well on South Road Loop Rd.
		4–from Oil Well to Hwy 82 entrance on South Road Loop Rd.	4–from Oil Well to Hwy 82 entrance on South Road Loop Rd.	4–from Oil Well to Hwy 82 entrance on South Road Loop Rd.
		1–on Curley Horse-Hummel Road	1–on Curley Horse-Hummel Road	
			3–from Ranch HQ to Agricultural Fields	
GROUP SIZE (requiring special recreation permit[1])	50 vehicles	30 or more people	30 or more people	30 or more people

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[1] Other conditions may warrant a special recreation permit, including commercial and competitive events.

Under Alternative 2, the capacity for the following group sites (general guidance only) are as follows:

> *Maternity Well*: 150 people or 30 vehicles with horse trailers or recreational vehicles.
>
> *Air Strip*: 500 people (combination of day use and group use areas). The vehicle capacity in the day use/trailhead area is 30 vehicles.
>
> *Agricultural Fields*: 1,000 people.

Under Alternative 2, at the Maternity Well group site BLM would move the parking area south of the existing corral to reduce visual impacts from the entrance road. BLM would also delineate a parking area with barriers of natural materials and, if needed, may harden the parking area with gravel or similar materials. If necessary, BLM might install a gate on this road to control access to the site. In addition, the water source might be moved so that camping in this area does not affect livestock or wildlife access to water. The Maternity Well group site would be open seasonally, generally from October to April.

Under Alternative 2 the Air Strip site would consist of a combination group site and trailhead. About 75% of the site would be open for group use on a reservation basis but would not be open to individual use. About 33% of this group site would consist of an overflow area for larger group events. BLM would reclaim and re-vegetate the site as needed to minimize bare ground, reduce visual impacts, and create more desirable camping opportunities.

The remaining 25% at the site would serve as a day use area and as a trailhead and parking area for the Arizona Trail. Trail users could park overnight in this area, and other visitors could use the area in the day. BLM would delineate the day use and trailhead parking area with barriers made of natural materials. The parking area could be hardened with gravel or similar material if necessary. The Air Strip group site would be open year round with periodic closures to allow the area to recover from impacts as determined by monitoring.

Under Alternative 2, the northeast corner of the Agricultural Fields would be designated as a group site and would have no development except for water at the Field Well. This site is specified for group events lasting no longer than 1 week. The Agricultural Fields would be open seasonally and could be closed, and numbers of users or length of events restricted due to environmental restoration.

Alternative 3: Activity Plan

Management Actions Common to Alternatives 2, 3, and 4

See Alternative 2 for Management Actions Common to the Action Alternatives for Upland Vegetation, Riparian, Fish and Wildlife, Cultural Resources, Access, and other Recreation Management Actions.

Cultural Resource Management Actions

Empire Ranch Headquarters

Management under Alternative 3 would be the same as under Alternative 2.

Cultural Properties outside the Headquarters Area

Management under Alternative 3 would be the same as under Alternative 2 except that under Alternative 3, Class III cultural resource surveys would be conducted on 94.2 miles of roads and trails by 2004.

Alternative 3 Livestock Grazing and Recreation Management Actions

Livestock Grazing Management Actions

Alternative 3 takes the traditional land management agency approach to livestock grazing management. Each allotment has a fixed stocking rate based on a "conservative " number of cattle

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that the agencies believe could be run every year on the allotments on a sustained yield basis (Table 2-28). The livestock numbers would be established in the livestock leases by each agency. The initial stocking rate would be based on the cattle numbers recommended in the NRCS ecological site guides for ranges with a "fair" similarity to the historic climax plant communities on each allotment. BLM would have to recommend that the ASLD reduce the cattle numbers on the BLM held leases to achieve the numbers proposed under this alternative.

Under Alternative 3, the stocking rate would not vary with changes in vegetation production. Table 2-29 shows the total vegetation production in favorable, normal, and unfavorable years (based on rainfall) on all lands within each allotment. Also shown is the average amount of forage that livestock could consume on these lands under established maximum stocking rates. In unfavorable years a proportionally greater percentage of the available forage is consumed than in favorable years. The available forage is assumed to be 50% of the total vegetation produced multiplied by the 35% utilization rate on lands allocated for livestock grazing.

Highlights of Alternative 3 Livestock Grazing Management Strategies

1. Four livestock operators would continue to lease public lands in the planning area on four individual grazing allotments (Empire-Cienega, Empirita, Rose Tree, and Vera Earl). A livestock grazing allotment would be established in the Empire Mountains.

2. Each allotment would implement a conservative set stocking rate with scheduled livestock rotations-next best pasture strategy.

Table 2-28. Proposed Authorized Grazing Use under Alternative 3, Las Cienegas Resource Management Plan

Allotment	[redacted]	BLM Acres Grazed	BLM Cows	BLM Acres not Grazed	ASLD Acres	ASLD Cows	Private Acres	Private Cows
Empire	[redacted]	36,025	390	659	3,7462	406	0	0
Empirita	[redacted]	1,480	14	40	23,468	215	0	0
Rose Tree	[redacted]	3,950	43	0	3,719	40	1,200	13
Vera Earl	[redacted]	1,440	16	0	0	0	na	na
Empire Mountains	[redacted]	2,480	27	2,480	0	0	1,044 Total Grazed 0	11
TOTAL	[redacted]	**43,895**	**486**	**699**	**64,649**	**661**	**2,244**	**24**

Table 2-29. Vegetation Production under Three Rainfall Regimes and Livestock Forage Consumption under Alternative 3 Livestock Management, Las Cienegas Resource Management Plan

	[redacted]	[redacted]	[redacted]	**Production Consumed by Total Cows (Million-lbs)**	**% Total Production Consumed**	**Available Forage (Million-lbs)**	**% Available Forage Consumed**
Favorable Year	[redacted]	[redacted]	[redacted]	11.28	6	33.00	34
Normal Year	[redacted]	[redacted]	[redacted]	11.28	9	21.58	52
Unfavorable Year	[redacted]	[redacted]	[redacted]	11.28	14	14.48	78

3. On each allotment the utilization limits would be adjusted downward from current levels as recommended by Holechek and others (1999). Like Alternative 2, Alternative 3 would implement utilization of 30-40% of current year's growth on key perennial grasses and assure that the physiological requirements of plant growth, rest, and reproduction are met for the following key species:

   Perennial Grasses
   - plains lovegrass (ERIN)
   - sideaots grama (BOCU)
   - cane beardgrass (BOBA3)
   - vine mesquite (PAOB)
   - black grama (BOER4)
   - hairy grama (BOHI2)
   - sprucetop grama (BOCH)
   - plains bristlegrass (SELE2)
   - wooly bunchgrass (ELBA)
   - green sprangletop (LEDU)
   - Arizona cottontop (DICA8)
   - crinkleawn (TRMO)
   - bush muhly (MUPO2)
   - prairie junegrass (KOCR)

4. BLM would eliminate the biological planning process on the Empire-Cienega allotment, and not apply similar biological planning processes to the other allotments. Proposed changes with which the livestock's operator does not voluntarily comply would need to go through BLM's grazing decision process, with the potential for hearings on and appeals of the proposed decisions. Change in livestock numbers on State Trust and privately owned or leased lands in the ranch operations would be outside BLM's influence.

Empire-Cienega Allotment (#6090)-Alternative 3 Proposed Management

Summary of RMP-Level Proposal

Under Alternative 3, BLM would allocate livestock forage on 36,025 acres of the 36,684 acres of public land within the existing Empire-Cienega allotment (# 6090), and 659 acres would be excluded from livestock grazing.

Activity Plan Proposal

The proposed livestock grazing management for the Empire-Cienega allotment under Alternative 3 would change the grazing strategy to a fixed conservative stocking rate with scheduled livestock rotations-next best pasture strategy. This is the traditional agency approach.

Summary of Empire-Cienega Grazing Management under Alternative 3

1. Establishes a conservative stocking rate (allowing for the dry years). The operator may run this number of cattle each year following a scheduled rotation that provides rest and deferments from livestock grazing. The stocking rate would be set at 796 cattle year-long (CYL) for the entire allotment (at 49% public land use) with scheduled rests and grazing deferments.

2. Eliminates the Biological Planning Team approach. BLM, the Arizona State Land Department, the grazing lessee, and other interested parties would monitor use levels and vegetation changes.

3. Modifies the grazing management plan to a fixed, conservative stocking rate. Range improvements proposed under Alternative 1 would be developed.

4. Reduces utilization to 30-40% of current year's growth on key perennial grass species as described in the Alternative 3 summary above.

5. Continues to implement the following measures to protect populations of Gila topminnow and topminnow habitat from grazing impacts:

   a. Limit livestock use in riparian areas of Cienega Creek, Mattie Canyon, and Empire Gulch with perennial water to the crossing lanes and watering areas listed in Table 2-25 and areas where BLM determines a need to use livestock grazing as a management tool to meet a riparian or aquatic-related resource objective.

   b. Rotate use of crossing lanes and move cattle through them within 21 days.

   c. Phase out water gaps in areas where adjacent upland waters are developed.

   d. Inspect and maintain riparian exclosure fences at least twice annually.

   e. Locate all new repressos (earthen stock ponds) to minimize the likelihood of floods or humans moving exotic fish and bullfrogs into topminnow habitat.

   f. Use repressos only when required to water cattle and allow repressos to dry when no longer needed. Drain repressos if they do not dry annually.

   g. Monitor the fish community and habitat, including crossing lanes, grazed riparian zones, and repressos to document the level of incidental take and to check for introduction of exotic fish and bullfrogs.

   h. Develop mitigation plans in coordination with the Fish and Wildlife Service for range improvements and vegetation treatments which may harm the topminnow or its habitat.

6. Continues to implement the following measures to protect the southwestern willow flycatcher and its habitat from grazing impacts:

   a. Exclude livestock grazing from occupied or unsurveyed, suitable habitat during the southwestern willow flycatcher breeding season (Apr. 1-Sept. 1) except for crossing lanes.

   b. Authorize no livestock management activities, including development of range improvements, in the riparian zone of occupied or unsurveyed, suitable willow flycatcher habitat during the willow flycatcher breeding season.

   c. Locate any new livestock management facilities that are likely to attract and support cowbirds more than 5 miles from occupied, suitable, or potential flycatcher habitat unless such facilities are crucial to protecting riparian habitat, and cowbird trapping is implemented to counteract the effect of the facility.

7. Adjusts livestock grazing rotation and utilization and installs more fencing as needed (1) to achieve the watershed cover required in the upland vegetation objective and (2) to leave enough cover after the summer livestock rotation to meet cover needs for antelope fawning as described in the pronghorn habitat objective (Upland Wildlife Habitat Subobjective B).

8. Adjusts grazing rotation by erecting a north-south Hilton pasture fence, and possibly an east-west Hilton pasture fence to ensure adequate cover for grassland sparrows as defined in the grassland sparrow subobjective (Upland Wildlife Habitat Subobjective A).

Empirita Allotment (#6210)

Summary of RMP Proposal

Under Alternative 3, BLM would allocate livestock grazing forage on 1,480 acres of the 1,520 acres of public lands within the Empirita allotment (#6210) and include the 40 acres at the Narrows in a livestock exclosure. BLM would continue to sublease the 23,468 acres of ASLD livestock grazing lease (05-437) to the Parsons Company.

Activity Plan Proposal

Alternative 3 would change the grazing management strategy for the Empirita allotment to a fixed conservative stocking rate with scheduled livestock rotations-next best pasture strategy, applying the traditional land management agency approach.

Summary of Empirita Grazing Management under Alternative 3

1. Establish a conservative stocking rate (allowing for the dry years). The operator may run this number of cattle each year following a scheduled rotation that provides rest and deferments from livestock grazing. The stocking rate would be set at 229 CYL on the entire allotment (at 6% public land use) with scheduled rests and grazing deferments.

2. BLM, the Arizona State Land Department, the grazing lessee, and other interested parties would monitor use levels and vegetation changes. Alternative 3 would not apply the Biological Planning Team approach. Under Alternative 3, the range improvements proposed for Alternative 1 would still be developed, and fencing and water developments would be installed for riparian pastures at the Narrows and around Nogales Spring.

3. Reduce utilization to 30-40% of current year's growth on key perennial grasses as described in the Alternative 3 summary above.

4. Continue to implement the following measures to protect populations of Gila topminnow and topminnow habitat from grazing impacts:

   a. Limit livestock use in riparian areas of Cienega Creek and Nogales Springs with perennial water to the Narrows crossing lane and watering area (Table 2-25) and areas where BLM determines a need to use livestock grazing as a management tool to

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meet a riparian or aquatic-related resource objective.

   b. Rotate use of crossing lanes and move cattle through them within 21 days.

   c. Phase out water gaps in areas where adjacent upland waters are developed.

   d. Inspect and maintain riparian exclosure fences at least twice annually.

   e. Locate all new repressos (earthen stock ponds) to minimize the likelihood of floods or humans moving exotic fish and bullfrogs into topminnow habitat.

   f. Use repressos only when required to water cattle and allow repressos to dry when no longer needed to water cattle. Drain repressos if they do not dry annually.

   g. Monitor the fish community and habitat, including crossing lanes, grazed riparian zones, and repressos to document the level of incidental take and to check for introduction of exotic fish and bullfrogs.

   h. Develop mitigation plans in coordination with the Fish and Wildlife Service for range improvements and vegetation treatments which may harm the topminnow or its habitat.

5. Continue to implement the following measures to protect the southwestern willow flycatcher and its habitat from grazing impacts:

   a. Exclude livestock grazing from occupied or unsurveyed, suitable habitat during the southwestern willow flycatcher breeding season (Apr. 1-Sept. 1) except for crossing lanes.

   b. Do not authorize livestock management activities, including development of range improvements, in the riparian zone of occupied or unsurveyed, suitable willow flycatcher habitat during the willow flycatcher breeding season.

   c. Locate any new livestock management facilities that are likely to attract and support cowbirds more than 5 miles from occupied, suitable, or potential flycatcher habitat unless such facilities are crucial to protecting riparian habitat, and cowbird trapping is implemented to counteract the effect of the facility.

Rose Tree Allotment (#6043)

Summary of RMP Proposal

Under Alternative 3 the resource management plan proposal is to allocate livestock grazing on 3,950 public land acres within the Rose Tree allotment with no exclosures. Grazing would also continue on the 3,719 acres of State Trust Land and 1,200 acres of private lands in the ranch operation for a total of 8,869 acres in the allotment.

Activity Plan Proposal

The activity plan proposal is to manage grazing with a conservative fixed stocking rate with scheduled livestock rotations-next best pasture strategy. Alternative 3 would apply the traditional land management agency approach.

Summary of Rose Tree Grazing Management under Alternative 3

1. Establish a conservative stocking rate (allowing for the dry years) of 96 cattle yearlong on the 3,950 acres of public lands at 46% public land use. The operator may run this number of cattle each year following a scheduled rotation that provides rest and deferments from livestock grazing.

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2. BLM, the Arizona State Land Department, the grazing lessee, and other interested parties would monitor use levels and vegetation changes. Alternative 3 would not apply the Biological Planning Team approach. As under Alternative 1, BLM would need to complete an ecological site inventory for this allotment to evaluate vegetation conditions. Also as under Alternative 1, BLM would need to evaluate current grazing management in light of the upland vegetation objective to determine if the allotment needs a new grazing management strategy (allotment management plan). The plan would include range improvements found to be needed to implement management changes.

3. Reduce utilization to 30-40% of current year's growth on key perennial grasses as described in the Alternative 3 summary above.

4. Adjust livestock grazing rotation and utilization and erect more fencing as needed to leave enough cover after the summer livestock rotation to meet cover needs for antelope fawning as described in the pronghorn habitat objective (Upland Wildlife Habitat Subobjective B) and the cover requirements in the upland vegetation objective.

5. Adjust grazing rotation as needed to ensure adequate cover for grassland sparrows as defined in the grassland sparrow subobjective (Upland Wildlife Habitat Subobjective A).

Vera Earl Allotment (#6129)

Summary of RMP Proposal

Under Alternative 3 the resource management plan proposal is to allocate livestock grazing on all 1,440 public land acres within the Vera Earl Allotment with no exclosures.

Activity Plan Proposal

The activity plan proposal is to manage grazing with a conservative fixed stocking rate, applying the traditional land management agency approach. BLM expects that the operator would continue the current rotational strategy with scheduled livestock rotations.

Summary of Vera Earl Grazing Management under Alternative 3

1. Because of the small acreage involved, the options for alternative management strategies would be limited if the rest of the Vera Earl allotment holdings are not included in the strategy for grazing of the 1,440 acres of public land.

OPTION A:

- Establish a conservative stocking rate (allowing for the dry years) of 16 CYL at 100% public land use.

- Allow seasonal livestock grazing by 48 cattle for a 4-month period during the year (48 CYL at 100% public land use = 144 AUMs). To prevent grazing during the same period each year, the operation would rotate the period of use. A conservative stocking rate would be established (allowing for the dry years), and the operator could run this number of cattle each year during the specified seasonal use period.

OPTION B:

- Base licensed on the total ranch holdings of about 23,240 acres, or 240 cattle for 12 months at 7% public land use (of which 1,440 acres is BLM administered). The other lands include national forest and about 6,000 acres of private land holdings of the ranch. The operator may run this number of cattle each year following a scheduled rotation that provides rest and deferments from livestock grazing.

The following actions would also be taken under either option A or B for the Vera Earl allotment:

2. BLM would not use the Biological Planning Team approach under either Option A or B but, as under Alternative 1, would need to complete an ecological site inventory for this allotment to evaluate vegetation conditions. BLM would also need to evaluate current grazing management in light of the upland vegetation objective to determine if a new grazing management strategy (allotment management plan) is needed. The plan would include range improvements found to be needed to implement management changes.

3. Under either option, reduce utilization to 30-40% of current year's growth on key perennial grass species as described in the Alternative 3 summary above.

4. Adjust livestock grazing rotation and utilization and erect more fencing as needed to leave enough cover after the summer livestock rotation to meet cover needs for antelope fawning as described in pronghorn habitat objective (Upland Wildlife Habitat Subobjective B) and the cover requirements in the upland vegetation objective.

5. Adjust the grazing rotation as needed to ensure adequate cover for grassland sparrows as defined in the grassland sparrow subobjective (Upland Wildlife Habitat Subobjective A).

Empire Mountains

Summary of RMP Proposal

Under Alternative 3 the resource management plan proposal for the Empire Mountains is to allocate livestock grazing on 2,480 public acres of the 3,524 total acres within the proposed Empire Mountains Allotment with no exclosures. The allotment would also include 1,040 acres of private lands.

Activity Plan Proposal

The activity plan proposal is to manage grazing with a conservative fixed stocking rate with scheduled livestock rotations-next best pasture strategy. This alternative would apply the traditional land management agency approach.

Summary of Empire Mountains Grazing Management under Altemative 3

1. Before authorizing any use BLM would complete a community-based grazing management plan with the affected lessee, agencies, and the private land owners.

2. Establish a conservative stocking rate (allowing for the dry years) of 38 cattle yearlong on the 3,524 acres allotted for grazing in the allotment (38% public land use). The 2,480 public land acres would be grazed on the allotment, according to the scheduled rotation that provides rest and deferments from livestock grazing.

3. BLM, the lessee, the Natural Resources Conservation Service, and other interested parties would monitor use levels and vegetation changes. Alternative 3 would not apply the Biological Planning Team approach. As under Alternative 2, BLM would need to complete an ecological site inventory for this allotment to evaluate vegetation conditions and develop an allotment management plan. The plan would include range improvements found to be needed to implement management changes.

4. Set the utilization limit to 30-40% of current year's growth on key perennial grasses as described in the Alternative 3 summary above.

Recreation Management Actions

Management within Recreation Zones

Table 2-26 summarizes the management prescriptions for each recreation zone. BLM would apply these prescriptions regardless of the different zone configurations under different alternatives.

Alternative 3 Designated Recreation Sites

Under Alternative 3, BLM would establish five group sites: Maternity Well, the Air Strip, Agricultural Fields, Antelope Release 1 (Road Canyon), and Antelope Release 2 (Hilton); five camp areas: Agricultural Fields, Antelope Release 1 (Road Canyon), Cieneguita, Oak Tree, and Oil Well; and at least 14 pullouts (Map 2-29). BLM would manage these sites according to the general management prescriptions for group sites, camp areas, and pullouts as described for Alternative 2.

Under Alternative 3, the capacity for the following group sites (general guidance only) is as follows:

> *Maternity Well*: 150 people or 30 vehicles with horse trailers or recreational vehicles.
>
> *Air Strip*: 500 people (day use and group use areas). The vehicle capacity in the day use/trailhead area is 30 vehicles.
>
> *Agricultural Fields*: 2,000 people
>
> *Antelope Release 1*: 50 people
>
> *Antelope Release 2*: 50 people.

Under Alternative 3, the Air Strip site would have the same management prescription as under Alternative 2, but proposed developments would be expanded to include the building of permanent toilets and water supplies.

Under Alternative 3, the Agricultural Fields would be open for group use on a reservation basis and would also be open to individual use when not reserved by a group. Only low-impact activities would be allowed with a duration of one week or less. BLM would designate a camping area on the eastern edge near the canal. No development is proposed except for water at the Field Well. The Agricultural Fields will be open seasonally but could be closed or visitor numbers restricted in response to environmental changes from restoring the area.

Under Alternative 3, the Antelope Release 1 (Road Canyon) and Antelope Release 2 (Hilton) group sites would be open for group use on a reservation basis and would also be open to individual use when not reserved by a group. Only low-impact activities would be allowed. The group sites would be closed during Antelope fawning (April-June) and may have other seasonal closures depending on resource conditions.

Alternative 4: Activity Plan

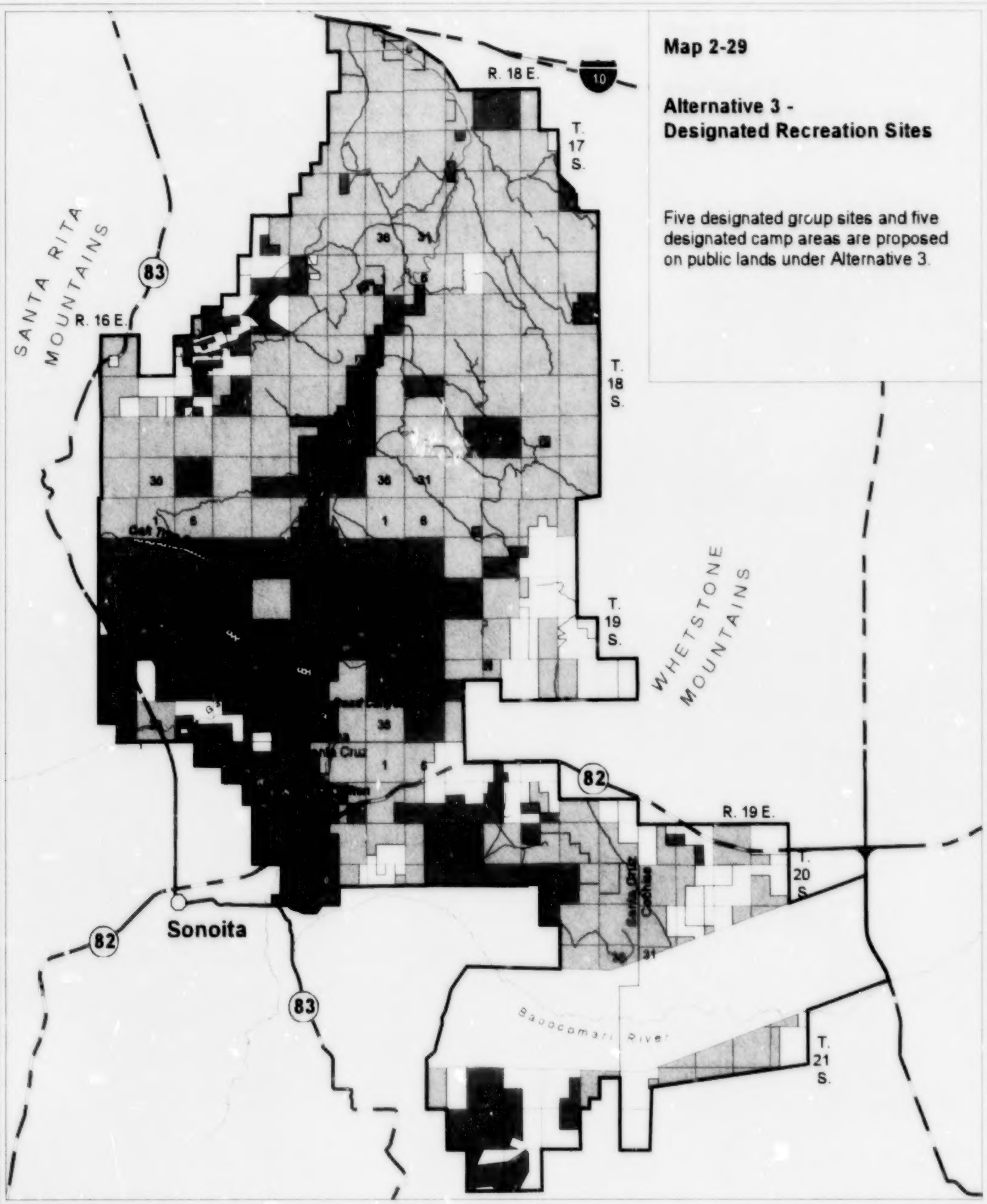
Management Actions Common to Alternatives 2, 3, and 4

See Alternative 2 for Management Actions Common to the Action Alternatives for Upland Vegetation, Riparian, Fish and Wildlife, Cultural Resources, Access, and other Recreation Management Actions.

Cultural Resource Management Actions

Empire Ranch Headquarters

Management under Alternative 4 would be the same as under Alternative 2 with the following exception: Because livestock would no longer graze on public lands, adaptive reuse would also occur for buildings that were supporting the grazing permittee.



Map 2-29

Alternative 3 - Designated Recreation Sites

Five designated group sites and five designated camp areas are proposed on public lands under Alternative 3.

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LEGEND
— Planning Area Boundary
■ BLM Land
▨ State Land
☐ Private Land
■ Designated Group Site
▨ Designated Camp Area

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Cultural Properties outside the Headquarters Area

Management under Alternative 4 would be the same as under Alternative 2 except for the following:

1. Selected sites outside the ranch headquarters would be allocated for scientific use. No properties or sites outside the ranch headquarters would be allocated for public use.

2. Any interpretive displays about prehistory or history of the ranch would be located at the headquarters area.

3. Class III cultural resource surveys would be conducted on 86.8 miles of roads and trails by 2004. A Class II cultural resource survey would be conducted on the planning area as funded. Class III cultural resource surveys would be conducted as needed on a project-by project basis.

Alternative 4 Livestock Grazing and Recreation Management Actions

Livestock Grazing Management Actions

Under Alternative 4, BLM would no longer allocate forage for livestock grazing on 43,594 acres of public lands within four existing allotments. BLM would cancel the grazing leases on the four grazing allotments (Empire-Cienega, Empirita, Rose Tree, and Vera Earl). BLM would need to fence all of the public lands to prevent unauthorized grazing from intermingled State Trust and private lands that are owned or leased by livestock operators for grazing use, if grazing continues on these lands.

Table 2-30 shows the total acres in each allotment; public land acres to be closed to livestock grazing; miles of fence that would be needed to exclude livestock grazing; and current authorized grazing use that would be canceled under Alternative 4 for each of the allotments. The last column shows the total number of livestock that potentially could continue to be stocked on State Trust and private lands within the four allotments on the basis of current stocking rates.

The interior pasture fencing for livestock watering and handling facilities would be removed as needed from public lands. To prevent livestock trespass from adjacent State Trust and private lands, BLM would need to build 140 miles of fencing to enclose the 46,074 public lands as shown in Table 2-30.

Table 2-31 shows the total vegetation production in favorable, normal, and unfavorable years (based on rainfall) on the public lands that would be closed to grazing. With the removal of livestock grazing from public lands, the additional forage on public lands would be allocated as wildlife habitat and for watershed protection. Also shown is the total vegetation production on State Trust and private lands within each allotment and the average amount of forage that livestock could continue to consume (based on the current maximum stocking rates) on these lands, if grazing continues. The available forage is assumed to be 50% of the total forage produced multiplied by the current 50% utilization on lands allocated for livestock grazing.

Table 2-30. Public Lands to be Closed to Livestock Grazing and Fencing Needed to Exclude Livestock from Public Lands under Alternative 4

Allotment	Total Acres of Open Space in Current Grazing Allotments	Acres of Public Lands to Be Closed to Grazing	Miles of Fencing Needed to Fence Public Lands	Cattle to Be Removed from Public Lands in the Planning Area	Cattle Potentially Remaining on State and Private Lands Within Existing Allotments in the Planning Area
Empire-Cienega	74,146	36,684	116	704	796
Empirita	24,988	1,520	12	9	328
Rose Tree	8,869	3,950	10	92	108
Vera Earl	1,440	1,440	2	27	na
TOTAL	**109,443**	**43,594**	**140**	**832**	**1,232**

[1] based on Alternative 1, Current Management

Table 2-31. Forage Produced under Three Rainfall Regimes and Livestock Forage Consumption under Alternative 4 Livestock Management (no livestock on public lands), assuming continued stocking of State and/or private lands,
Las Cienegas Resource Management Plan

	Public Land Acres Closed to Grazing	Total Production Allotment Acres (Million-lbs)	Total Acres Grazed State and/or Private	Total Cows	Total Production Of State and Private Grazed Acres (Million-lbs)	Production Consumed By Total Cows (Million-lbs)	% Total Production Consumed	Available Forage (Million-lbs)	% Available Forage Consumed
Favorable Year	43,594	77.45	65,849	1232	104.8	11.8	11.3	26.1	45.2
Normal Year	43,594	51.71	65,849	1232	69.6	11.8	17.0	17.4	67.8
Unfavorable Year	43,594	34.42	65,849	1232	45.6	11.8	25.9	11.4	100

Recreation Management Actions

Management within Recreation Zones

Table 2-26 summarizes management prescriptions for each recreation zone. BLM would apply these prescriptions regardless of zone configurations under different alternatives.

Alternative 4 Designated Recreation Sites

Alternative 4 would establish one group site at the Air Strip, designate four camping areas at Antelope Release 1 (Road Canyon), Oak Tree, Cieneguita, and Oil Well, and prescribe at least 10 pullouts (Map 2-30). BLM would manage these sites according to the general management prescriptions for group sites, camp areas, and pullouts as described for Alternative 2.

Under Alternative 4, BLM would open the Air Strip site to group use on a reservation basis and to individual and day use when no groups have reserved the site with a permit. The site's capacity would be set at 300 people but could be less depending on the type of activity. BLM would rehabilitate (rip and re-vegetate) about one-third of the air strip and partially re-vegetate the remaining two-thirds. The group site would have no other improvements. Parking would be limited to one end of the group site in an area marked by barriers using natural materials. BLM would allow group activities only under a special recreation permit and would monitor impacts to determine if the site's management needs to be adjusted. Under Alternative 4, the trailhead for the Arizona Trail would be placed at the ranch headquarters.

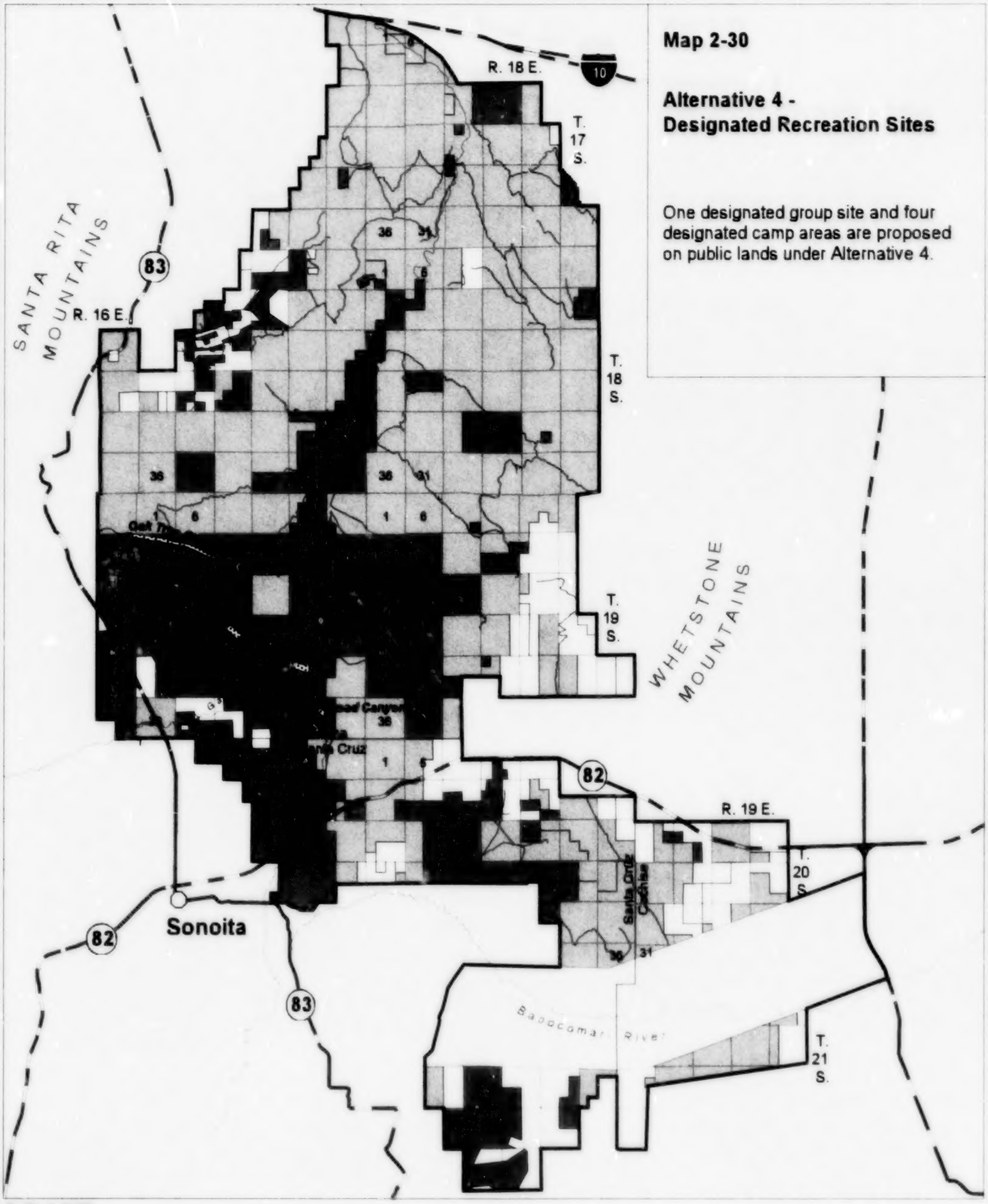
MONITORING AND PLAN EVALUATION

MONITORING

Monitoring is an essential component of an adaptive management strategy. Monitoring data is used to assess resource conditions, identify resource conflicts, determine if resource objectives are being met, and periodically refine and update desired conditions and management strategies.

Ongoing monitoring that would be continued under all alternatives (see Appendix 2 for monitoring protocols) includes the following:

- Native Fish Monitoring. At least 5 aquatic habitats will be monitored annually using one-pass sampling with seines to determine relative abundance and population trends of Gila topminnow and to screen for exotic fishes and bullfrogs.
- Aquatic Habitat Monitoring. At least 4 - 0.25 mile reaches of Cienega Creek will be monitored every 3 years to determine habitat trends.
- Riparian Monitoring. Riparian condition will be reassessed every 5 years at key riparian monitoring sites.
- Upland Vegetation Monitoring. Upland vegetation will be monitored at permanent vegetation transects on the Empire-Cienega and Empirita allotments. A proportion of these transects will be monitored annually. In addition, habitat components for pronghorn fawns and grassland sparrows will be monitored annually along transects in key areas.



Map 2-30

Alternative 4 - Designated Recreation Sites

One designated group site and four designated camp areas are proposed on public lands under Alternative 4.

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LEGEND

— Planning Area Boundary

▇ BLM Land

▒ State Land

☐ Private Land

■ Designated Group Site

▨ Designated Camp Area

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- Water Quantity Monitoring. Stream discharge measurements will be obtained from a continuous recording stream gage on Cienega Creek.

In addition, under Alternatives 2, 3, and 4, a threat-based ecological monitoring program is proposed (Appendix 2) to expand ongoing monitoring efforts. The ecological monitoring program would be an integral part of BLM's Final Las Cienegas Resource Management Plan and would help ensure that the Empire-Cienega RCA's (now Las Cienega's NCA) resources are protected over both the short and long term under a flexible, multi-use management plan. Development of partnerships would be an important factor in implementing the monitoring program.

Under Alternatives 1 and 2, the biological planning process would be continued as described for the Alternative 1 and 2 activity plans. Informal evaluations of monitoring data would occur twice a year when the Biological Planning Team meets to discuss livestock and recreation management activities.

PLAN EVALUATIONS

Plan evaluations determine whether the land use plan decisions and NEPA analysis are still valid and whether the plan is being implemented. At a minimum, BLM will conduct formal plan evaluations every 5 years. Results of plan evaluations will be included in a report to the BLM Field Manager. The following questions are generally addressed in plan evaluations:

1. Are actions outlined in the plan being implemented?
2. Is BLM achieving or likely to achieve resource goals, standards, and objectives?
3. Are the allocations, constraints, or mitigation measures effective in achieving objectives?
4. Do decisions continue to remain valid over time?
5. Has there been significant change in the related plans of Indian tribes, State or local governments, or other federal agencies?
6. Are new data or analyses significant to the planning decisions or the validity of the NEPA analysis?
7. Can unmet needs or new opportunities best be met through a plan amendment or revision or will current management practices be sufficient?
8. Is new information needed to resolve a new or existing issue?

INFORMATION NEEDS

The actions in this section are proposals to increase the knowledge base for the Empire-Cienega Planning Area. In some instances BLM must have the information from these inventories or studies before changing management. In other instances such information is desirable for making more informed land management decisions. These studies and inventories will supplement the monitoring proposals described later in this document in tracking the progress of proposed actions in meeting resource objectives.

INVENTORIES AND ASSESSMENTS

1. Assess the road system to determine what design changes are needed to halt excessive erosion or other resource impacts.

2. Inventory all natural and developed water sources within the planning area to determine their use and reliability as wildlife water sources and to determine if more waters are needed.

VEGETATION STUDIES

1. In partnership with other agencies and entities, continue to complete ecological site inventories of all lands in the planning area. In particular, inventories are needed of the current vegetation conditions in the Rose Tree and Vera Earl allotments and the Empire Mountains.

2. Continue to work on developing and refining riparian ecological site descriptions (including sites for interior marshland communities) for Empire-Cienega riparian areas.

3. Place surveyed cross sections in key riparian segments (geo-referenced).

FISH AND WILDLIFE STUDIES

As funding and priorities allow, support research in priority species and habitats, including the following:

1. Collect information on roost locations and the timing and level of use of flowering agave by lesser-long-nosed bats in the Sonoita Valley and the relationships of grazing and prescribed fire to survival and reproduction of agave populations.

2. Study pronghorn and mule deer, including population viability, movements, and use patterns, to determine population and habitat relationships to proposed land uses and ongoing development patterns. Study the effect of prescribed fire on Baird's and Botteri's sparrows.

3. Study the effect of prescribed fires in uplands on water quality and on the fish community in Cienega Creek.

CULTURAL RESOURCE STUDIES

1. Conduct a Class II cultural resources inventory of the planning area as funding allows.

2. Conduct ethnographic and historic studies for the planning area, including ethnoecology and an oral history collection as funding allows.

COMPARATIVE SUMMARY OF IMPACTS BY ALTERNATIVE

See Table 2-32, beginning on the following page.

Table 2-32. Comparison of Impacts, Las Cienegas Resource Management Plan

Resource Affected	Impacts From Alternative 1 (Current Management)	Impacts From Alternative 2 (Agency Preferred)
PHYSICAL RESOURCES		
Air Quality	No impacts.	Short-term lowering of air quality from prescribed fires. Slight improvement in air quality from road restrictions or closures and recreation permit system.
Watersheds ***Scope of Analysis:* Impacts to watershed resources and processes, including soils, groundwater, surface water, and vegetation cover.**	Alternative 1 might fail to meet upland and riparian vegetation objectives over the long term due to watershed impacts such as increased erosion and runoff and decreased infiltration from lack of vegetation treatments. The result would be a shrub invasion combined with impacts of grazing, increasing unmanaged recreation, an extensive road network, proliferating utility lines, and potential for mineral development, which would disrupt hydrologic processes.	Alternative 2 more emphasizes maintaining and improving overall watershed health than do Alternatives 1, 3, or 4 due to the emphasis on ecosystem (watershed) management and collaboration, combined with flexible grazing management; integrated vegetation treatment; elimination of potential for mineral development; and designation of utility corridors, recreation zones, and all public land in planning area as an ACEC.
	Impacts from developments and concentrated activities, including roads, utility lines, recreation sites, administrative sites, and livestock developments total 2,680 acres (5.5%) of public land. Impacts include loss of vegetation cover, soil disturbance, increased erosion, and sedimentation.	Impacts from developments and concentrated activities, including roads, utility lines, recreation sites, administrative sites, and livestock developments, total 2,400 acres (4.9%) of public land. Impacts include loss of vegetation cover, soil disturbance, and increased erosion and sedimentation.
	Dispersed recreation impacts would occur on all 49,000 acres of public land. Impacts could include localized loss of vegetation cover; soil disturbance; and increased erosion from roads, trails, and dispersed camp sites.	Dispersed recreation impacts would occur on 44,387 acres (91%) of public land. Impacts could include localized loss of vegetation cover; soil disturbance; and increased erosion from roads, trails, and dispersed camp sites.
	Livestock grazing impacts would occur on 41,855 acres (85%) of public land and could include loss of vegetation cover, increase in shrub component, and soil disturbance.	Livestock grazing impacts would occur on 42,155 acres (86%) of public land. Impacts could include loss of vegetation cover, increased shrub component, and soil disturbance. Livestock grazing management under Alternative 2 would improve watershed conditions and aid in attaining the upland and riparian objectives better than would Alternative 1. Adaptive management of livestock numbers and rotation systems adjusted for current grass production would likely improve vegetation and soil cover conditions and stability.

Impacts From Alternative 3	**Impacts From Alternative 4**
Same as under Alternative 2.	Same as under Alternative 2.
Of all alternatives, Alternative 3 least emphasizes maintaining and improving watershed health due to large area open to mineral development, less flexible grazing management, and 90% less area designated as ACECs.	Of all alternatives, Alternative 4 would most emphasize maintaining and improving watershed health on the public land portion of the watershed due to elimination of mineral development and public land livestock grazing, extensive road closures, and designation of only one utility corridor. But the cumulative impacts of the loss of open space and decline in watershed condition could be substantial if ranches are sold for development due to loss of public grazing lands.
Impacts from developments and concentrated activities including roads, utility lines, recreation sites, administrative sites, and livestock developments total 2,440 acres (5%) of public land. Impacts would include loss of vegetation cover, soil disturbance, and increased erosion and sedimentation.	Impacts from developments and concentrated activities, including roads, utility lines, recreation sites, and administrative sites, total 540 acres (1%) of public land. Impacts would include loss of vegetation cover, soil disturbance, and increased erosion and sedimentation.
Dispersed recreation impacts would occur on 31,040 acres (63%) of public land. Impacts could include localized loss of vegetation cover; soil disturbance; and increased erosion from roads, trails, and dispersed camp sites. Recreation management is likely to have a beneficial long-term impact, and of all alternatives would go further to facilitate meeting the upland vegetation objective due to the larger area in Zones 1 and 2, which restrict uses to designated sites.	Dispersed recreation impacts would occur on 45,730 acres (93%) of public land. Impacts could include localized loss of vegetation cover, soil disturbance, and increased erosion from roads, trails, and dispersed camp sites.
Livestock grazing impacts would occur on 43,895 acres (90%) of public land. Impacts could include loss of vegetation cover, increased shrub component, and soil disturbance. Grazing management would be more likely to degrade watershed conditions over the long term than grazing management under Alternative 1 due to potentially slower adjustments in drought years.	Livestock grazing impacts would be eliminated on public land over the long term, but some impacts would temporarily remain.

Table 2-32, continued. Comparison of Impacts, Las Cienegas Resource Management Plan

Resource Affected	**Impacts From Alternative 1 (Current Management)**	**Impacts From Alternative 2 (Agency Preferred)**
PHYSICAL RESOURCES		
Watersheds, continued ***Scope of Analysis: Impacts to watershed resources and processes, including soils, groundwater, surface water, and vegetation cover.***	Potential for mining impacts on 6,373 acres (13%) of public land and federal mineral estate. Impacts could include reduced water quantity, loss of vegetation cover, soil removal, decreased water infiltration, increased runoff, increased erosion and sedimentation, and associated channel adjustments.	Potential for mining impacts would be eliminated except for developing existing claims on 6,373 acres of public land and federal mineral estate. Vegetation treatments would improve watershed condition over the long term by reducing shrubs and promoting grass cover, which decreases runoff and improves infiltration. Fish and wildlife habitat improvements would enhance vegetation structure, and increased cover would promote healthy watershed conditions.
Water Quality	No direct, indirect, or cumulative impacts on water quality are expected from current watershed, upland, and riparian area management; VRM Class III designation; or lack of ACEC designation. Impacts would be generally positive from fish and wildlife management. Even limited actions to improve habitat for special status species would reduce runoff, erosion, sedimentation, and turbidity, contributing to improved water quality. Actions taken to meet cultural resource objectives would have an imperceptible impact, but restoring historic sites might increase visitation and traffic with associated harm to road condition, erosion, and water quality. Any mineral development under current management would become a potential source of water quality degradation. Without designating a utility corridor, rights-of-way could proliferate, increasing disturbed or exposed surface area and runoff, erosion, and sedimentation in Cienega Creek.	Increasing vegetation cover resulting from watershed and upland vegetation management, particularly vegetation treatments, would reduce runoff, erosion, and sedimentation of drainages. Riparian area management would also reduce the load of sediment entering the channels of the management area. Fish and wildlife management actions to improve habitat through overall watershed condition improvement would reduce runoff, erosion, sedimentation, and turbidity, improving water quality. No impacts are expected from VRM Class II designation. Cultural resource management impacts would be the same as under Alternative 1. Continuing current closure to mineral development and petitioning to withdraw more lands from mineral entry would significantly lower the risk of future water quality degradation from mining contaminants that could reach Cienega Creek in runoff. Designating right-of-way corridors would limit impacts on water quality to those occurring in existing rights-of-way.

Impacts From Alternative 3	Impacts From Alternative 4
Potential for mining impacts on 46,915 acres (96%) of public land and federal mineral estate. Impacts could include reduced water quantity; loss of vegetation cover; soil removal; decreased water infiltration; increased runoff, erosion, and sedimentation; and associated channel adjustments. Vegetation treatments would improve watershed condition over the long term by reducing shrubs and promoting grass cover, which decreases runoff and improves infiltration. Fish and wildlife habitat improvements would enhance vegetation structure, and increased cover would promote healthy watershed conditions.	Potential for mining impacts would be eliminated except for developing existing claims on 6,373 acres of public land and federal mineral estate. Vegetation treatments would improve watershed condition over the long term by reducing shrubs and promoting grass cover, which decreases runoff and increases infiltration. Fish and wildlife habitat improvements would enhance vegetation structure, and increased cover would promote healthy watershed conditions.
Impacts from watershed, upland, riparian, fish and wildlife, cultural and visual resource management would be the same as described for Alternative 2. Mineral development would degrade water quality as described for Alternative 1 but over a potentially much larger area because public land outside ACECs would be opened to mining.	Impacts from watershed, upland, riparian, fish and wildlife, cultural and visual resources management would be the same as described for Alternative 2. Impacts from mineral development, utility rights-of-way, land use authorizations, and off-highway vehicle and recreation management would essentially be the same as described for Alternative 2.

Table 2-32, continued. Comparison of Impacts, Las Cienegas Resource Management Plan

Resource Affected	Impacts From Alternative 1 (Current Management)	Impacts From Alternative 2 (Agency Preferred)
PHYSICAL RESOURCES		
Water Quality, continued	Unpaved roads are a significant source of turbidity and sedimentation in drainages such as Cienega Creek, which receives runoff from the entire planning area. Lack of road closures or restrictions and increased use of the existing road network would continue to degrade water quality in Cienega Creek. Slightly negative impacts, including runoff, sedimentation, and even bacterial contamination of surface water, would result from dispersed, unrestricted recreation. As use increases, the impacts on water quality would likely increase at a higher rate than under the other alternatives. Impacts from current grazing management on water quality would be similar to impacts of grazing on watershed, riparian, and aquatic resources. Maintaining or improving the condition of riparian and upland pasture vegetation is highly important in improving water quality.	Designating roads for OHV use would reduce the number of roads on which vehicles would travel. The result would be a reduced risk of increased sedimentation, turbidity, and accidental spills of petroleum products in Cienega Creek and its tributaries. There is a long-term risk of negative impacts if OHV use increases to a level at which benefits of designated roads would be offset by the damage done by increased traffic. Designating recreation zones and associated management would only slightly affect water quality. Loss of vegetation cover at concentrated recreation use sites would slightly increase sedimentation in drainages. Establishing concentrated use areas and increasing use of dispersed hiking and camping areas, particularly near streams, would increase the risk of human waste degrading water quality. New construction for the Arizona Trail would cause a transitory increase in sedimentation in Cienega Creek, especially where the trail is runs close to the creek. Livestock grazing impacts would be similar to those under Alternative 1 and would slightly reduce turbidity and fecal coliform in Cienega Creek over time. ACEC designation should help promote improved water quality through management prescriptions to improve vegetation cover and manage livestock and recreation to minimize direct impacts to streams.
BIOLOGICAL RESOURCES		
Upland vegetation ***Scope of Analysis: Changes in upland vegetation condition and ability to meet the upland vegetation objective.***	Lack of an integrated vegetation treatment strategy would result in long-term invasion of mesquite and burroweed into grassland sites. This invasion would cause a decline of herbaceous vegetation cover on the soil surface and an increase in deeper rooted woody perennials. If the trend continues, ecological condition would fail to meet the Arizona Standards for Rangeland Health.	Implementing an integrated vegetation treatment would reverse the long-term invasion of woody species. These treatments would convert nearly 20,000 acres of shrub-invaded grassland to a visual aspect of open grassland. Improved upland condition would result. Objectives for fish and wildlife would guide upland vegetation management and might constrain vegetation treatments and range improvements.

Impacts From Alternative 3	Impacts From Alternative 4
Impacts from utility rights-of-way and land use authorizations, off-highway vehicle management, and the Arizona Trail would be the same as described for Alternative 2. Recreation management would be likely to similarly affect water quality as under Alternative 2. Many more acres in Zone 2 could slightly increase concentrated use, and result in an associated increase in runoff and risk of degrading water quality. Livestock grazing management would have greater water quality impacts than under Alternatives 1 and 2 due to the fixed stocking rate. Under unfavorable conditions such as drought, the less flexible management could result in overgrazing and insufficient cover to protect the surface. Sedimentation, increased turbidity, and exceeding standards for fecal coliform could result.	The Arizona Trail would follow existing roads and would not require construction. Eliminating livestock grazing would likely increase upland cover and end cattle disturbance of riparian areas and stream banks. The resulting infiltration of more precipitation and increased density of vegetation in the riparian areas would improve water quality. Sediment, turbidity, and fecal coliform in perennial water would decline. Improvement in water quality is likely to be modest because upland condition is already good and water quality is now meeting state standards.
ACEC designation would also benefit water quality but less than under Alternative 2, which would have four times more area in ACECs.	Benefits of ACEC designation would be the same as under Alternative 2.
Impacts from watershed, upland, riparian, fish and wildlife, cultural, and visual resource management would be the same as described for Alternative 2.	Impacts from watershed, upland, riparian, fish and wildlife, cultural, and visual resources management would be the same as described for Alternative 2.

Table 2-32, continued. Comparison of Impacts, Las Cienegas Resource Management Plan

Resource Affected	Impacts From Alternative 1 (Current Management)	Impacts From Alternative 2 (Agency Preferred)
BIOLOGICAL RESOURCES		
Upland vegetation, continued ***Scope of Analysis: Changes in upland vegetation condition and ability to meet the upland vegetation objective.***	Current fish and wildlife and cultural resource management would not affect upland vegetation. Implementing VRM Class III could constrain vegetation treatments and range improvements, increasing costs. Mining could remove or disturb upland vegetation on 6,373 acres of public and split- estate lands, and mining infrastructure could indirectly affect more vegetation. Proliferation of utility lines and service roads without corridor designation could remove or harm upland vegetation. Expanding unauthorized roads due to lack of full implementation of a designated road system would remove or harm upland vegetation. Increased recreation use has increased disbursed recreation impacts, including vegetation trampling, and unplanned fire starts from vehicles, campfires, cigarettes, and arson. Livestock would graze 41,855 acres of upland vegetation. Current upland vegetation condition is meeting Arizona Standards for Rangeland Health. Although overall vegetation conditions are improving under current livestock management, mesquite and brush, which are invading in response to past livestock use and fire suppression, might need to be removed through vegetation treatment. Lack of ACEC designation would not provide special management for upland areas.	Implementing VRM Class II could more constrain vegetation treatments and range improvements than the less restrictive VRM Class III. Cultural resource management would also constrain vegetation treatments and range improvements and increase the cost of achieving desired upland vegetation conditions. Continued closure of acquired lands to mineral development and withdrawal of 6,373 more acres from mineral entry would prevent impacts to upland vegetation described for Alternative 1. Utility development within the two designated corridors would potentially disturb more upland vegetation but probably to a lesser extent than under Alternative 1. Fully implementing the designated road system should minimize unauthorized roads and protect more upland vegetation than under current management. Road closures would restore 23.3 acres of upland vegetation. Establishing recreation zones would limit camping-related vegetation disturbance on 4,613 acres in Zones 1 and 2. Dispersed recreation would still slightly disturb upland vegetation on 44,387 acres of public land in Zone 3. Building the Arizona Trail would disturb 4 acres of upland vegetation. Establishing a permit system would allow BLM to adjust recreation levels to ensure that upland objectives continue to be met. Livestock would graze 42,155 acres of upland vegetation. Livestock grazing management would benefit watershed condition and function more than under Alternative 1 as described in the impacts to watershed section. ACEC designation would emphasize increased protection of sensitive areas, including upland vegetation, and direct more resources to achieving desired upland vegetation condition.

Impacts From Alternative 3	Impacts From Alternative 4
Mineral development would disturb upland vegetation as described under Alternative 1, but impacts could occur over a much larger area. Utility rights-of-way and land use authorizations would disturb upland vegetation as described for Alternative 2, but impacts could be greater because of the added right-of-way and associated service roads.	Mineral development would affect upland vegetation the same as under Alternative 2. Utility rights-of-way and land use authorizations would affect upland vegetation as described for Alternative 2, but impacts of rights-of-way would be confined to one corridor.
Impacts of OHV management would be the same as for Alternative 2. About 16.5 acres of upland vegetation would be restored on closed roads, less than under Alternative 2. Recreation impacts on upland vegetation would be less than under Alternatives 1 or 2 because more area (17,960 acres) would be restricted to designated sites. The Arizona Trail would affect upland vegetation the same as under Alternative 2.	Impacts of OHV management would be the same as under Alternative 2. Forty acres of upland vegetation would be restored on closed roads, more than under any of the other alternatives. Recreation zones would limit camping-related vegetation disturbance on 3,270 acres in Zones 1 and 2, less than under either Alternative 2 or 3. Dispersed recreation would still slightly disturb upland vegetation on 45,730 acres of public land in Zone 3. Routing the Arizona Trail along existing roads would preclude more disturbance of upland vegetation from construction.
Livestock grazing management under Alternative 3 would allow the five allotments to meet the upland vegetation objective for most years. Livestock would graze 43,895 acres of upland vegetation. During extended drought the risk of overstocking and overgrazing would increase because livestock management could not change as fast as field conditions might require with a fixed stocking rate. This grazing strategy might degrade vegetation and watershed if plants lose vigor because of persistent low soil moisture and continued grazing at fixed levels.	Livestock would no longer graze 41,855 acres, but residual effects of grazing such as changes in species composition, increases in invasive species, or increases in certain exotics would remain at least in the short term.
ACEC designation would affect upland vegetation much as under Alternative 1 but Alternative 3 would reduce the scope of protection by about 90% for 4,859 instead of 45,859 acres.	Impacts of ACEC designation on upland vegetation would be as described for Alternative 2.

Table 2-32, continued. Comparison of Impacts, Las Cienegas Resource Management Plan

Resource Affected	Impacts From Alternative 1 (Current Management)	Impacts From Alternative 2 (Agency Preferred)
BIOLOGICAL RESOURCES		
Riparian/Wetland Vegetation ***Scope of Analysis: Changes in riparian condition and function and ability to meet the riparian objective.***	Lack of vegetation management might prevent the riparian objective from being met. Shrub invasion and decreased soil stability in the watershed could cause rapid stream adjustments from changes in peak flows. Sediment inputs would temporarily degrade riparian resources. No impacts from current fish and wildlife, cultural, or visual resource management. Large-scale mineral development on lands open to mining might prevent the riparian objective from being met. Water quality could be lowered by excess sedimentation or release of toxic materials. Water quantity could be reduced by water extraction for mining or associated development. The riparian objective could be met with the addition of new utilities unless they proliferate to an extent that they degrade the watershed. Increases in sedimentation and runoff from utility corridor development could be substantial, and lines crossing riparian areas could lead to bank instability and sedimentation. Current off-highway vehicle management generally protects riparian vegetation and stream banks and supports meeting the riparian objective. But the 11 road crossings are a source of sedimentation and harm to stream banks and riparian vegetation.	Implementing integrated vegetation management would improve watershed condition and benefit wetland and aquatic areas through reduced sedimentation and frequency of peak flood flows and increased groundwater recharge, which feeds springs that support riparian plant communities. Prescribed fire would pose a risk of localized short-term harm from loss of mature riparian trees if fire escaped into a riparian area. Fish and wildlife management would benefit riparian/ wetland areas. Securing an instream flow right would help assure the sustainability of perennial water in Cienega Creek over the long term. Restrictions on livestock and recreation use of riparian areas to protect threatened and endangered species would also protect riparian vegetation and banks. Reintroducing beaver would change stream channel geometry and vegetation, leading to expansion of marsh habitats and increased structural diversity of riparian vegetation. No impacts from cultural or visual resource management. Eliminating the potential for mining on public land would greatly reduce the risk of impacts, including riparian habitat degradation from sedimentation, excessive water use, and contamination described for Alternative 1. Utility corridor designation would eliminate most of the risk of direct impacts on riparian areas from new utilities that might occur under Alternative 1. Impacts of OHV designation would be the same as under Alternative 1, but eliminating all but one road stream crossing would alleviate the impacts of bank erosion and sedimentation.

Impacts From Alternative 3	Impacts From Alternative 4
Impacts from watershed, upland, riparian, fish and wildlife, cultural, and visual resources management would be the same as under Alternative 2.	Impacts from watershed, upland, riparian, fish and wildlife, cultural, and visual resource management would be the same as described for Alternative 2.
Mineral development would have more potential to degrade riparian areas than under other alternatives because more area would be open to mineral development. Utility rights-of-way and land use authorizations would affect riparian areas the same as under Alternative 2.	Impacts from mineral development, utility rights-of-way, and road designations would be the same as described for Alternative 2.
Off-highway vehicle management would affect riparian areas as under Alternative 1. Road closures and restrictions would affect riparian areas as described for Alternative 2 but a smaller acreage of roads would be closed and rehabilitated.	

Table 2-32, continued. Comparison of Impacts, Las Cienegas Resource Management Plan

Resource Affected	Impacts From Alternative 1 (Current Management)	Impacts From Alternative 2 (Agency Preferred)
BIOLOGICAL RESOURCES		
Riparian/Wetland Vegetation, continued ***Scope of Analysis: Changes in riparian condition and function and ability to meet the riparian objective.***	Current recreation management could disturb sensitive riparian areas if use levels increase substantially. Lack of restrictions on camping and other activities in riparian areas exposes riparian areas to impacts of dispersed recreation use. The lack of an Arizona Trail designation would not affect riparian/wetland vegetation. Livestock grazing management excludes livestock from most riparian areas. Increased vegetation cover, structure, and composition are leading to more stable riparian areas and potential natural communities. But livestock in crossing lanes and watering areas trample stream banks and disturb riparian vegetation. Lack of ACEC designation means that no specific management actions to protect sensitive wetland and aquatic areas would be prescribed.	Increasing recreation use in riparian areas could trample vegetation and damage stream banks. Some of these impacts would be offset by camping and vehicle restrictions in riparian areas. A recreation permit system would help ensure that use levels are compatible with maintaining riparian function and condition. The Arizona Trail would have no direct impacts. Livestock grazing management would likely benefit riparian areas more than under Alternative 1 due to improved watershed conditions and increased flexibility in management, allowing a more rapid response to changes in resource condition. Continued exclosure of riparian areas to livestock would allow riparian vegetation to rapidly reach its potential. ACEC designation would emphasize a collaborative approach to watershed management and increased protection of riparian areas, and would potentially direct more resources to the area, benefitting riparian areas.
Fish and Aquatic Wildlife (includes aquatic threatened and endangered species) ***Scope of Analysis: Changes in habitat features and populations of fish and aquatic wildlife.***	Lack of integrated vegetation treatment and subsequent impacts on watershed condition might change habitats, including loss of pools from sedimentation and loss of cover from channel adjustments that would degrade aquatic habitat important to federally listed and other aquatic wildlife, including Gila topminnow, Gila chub, longfin dace, leopard frogs, and Mexican garter snake. Current fish and wildlife management includes consultations to reduce harm to endangered or threatened species and aquatic habitats. The Gila topminnow's range would expand to improve the status of the Cienega Creek lineage. Current cultural or visual resource management would not affect fish and aquatic wildlife.	Implementing integrated vegetation treatment would improve watershed condition. The result would be improved aquatic habitats due to lower sedimentation and higher channel stability, which promote high levels of instream cover, a large range of water depths and velocities, and riparian canopy cover development that tempers seasonal extremes in water temperatures. Gila topminnow, Gila chub, longfin dace, leopard frogs, Mexican garter snake, and Huachuca water umbel would all benefit. Prescribed fires could lower water quality and disturb aquatic species, but fire planning should minimize risks.

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Impacts From Alternative 3	Impacts From Alternative 4
Recreation management would affect riparian areas the same as under Alternative 2. The Arizona Trail would cross the riparian area through the Narrows and degrade fragile floodplain soils and damage riparian vegetation. Livestock grazing management would have similar direct impacts to riparian areas as under Alternatives 1 and 2 because cattle would continue to be excluded. During drought, fixed stocking rats might degrade watershed condition, increasing runoff, flood peaks, and sedimentation and decreasing aquifer recharge and base flows. 90% less acreage would be designated as ACECs, but most riparian areas would be included and protected by special management.	Impacts recreation management and the Arizona Trail would be the same as described for Alternative 2. Eliminating livestock grazing on public land under Alternative 4 would affect riparian areas in much the same way as under the other alternatives. Livestock management under the other alternatives would virtually eliminate direct cattle impacts to riparian areas through exclosure. Alternative 4 would further eliminate impacts from crossing lanes and watering areas and from trampling around livestock developments. Possible improvements in watershed health could slightly lower peak flows and sedimentation and increase infiltration, aquifer recharge, and duration and length of perennial flow. ACEC designation would affect riparian areas the same as under Alternative 2.
Impacts from watershed, upland, riparian, fish and wildlife, cultural and visual resources management would be the same as described for Alternative 2. Mineral development would have greater potential to disturb fish and aquatic wildlife and plants than under the other alternatives because more area would be open to mineral development. Utility rights-of-way and land use authorizations would affect fish and aquatic wildlife and plants the same as under Alternative 2. Management of off-highway vehicles would affect fish and aquatic wildlife and plants as described for Alternative 1. Road closures and restrictions would affect fish and aquatic wildlife and plants as described for Alternative 2, but a smaller acreage of roads would be closed and rehabilitated.	Impacts from watershed, upland, riparian, fish and wildlife, cultural, and visual resource management would be the same as described for Alternative 2. Impacts from mineral development, utility rights of ways, and road designations would be the same as described for Alternative 2.

Table 2-32, continued. Comparison of Impacts, Las Cienegas Resource Management Plan

Resource Affected	Impacts From Alternative 1 (Current Management)	Impacts From Alternative 2 (Agency Preferred)
BIOLOGICAL RESOURCES		
Fish and Aquatic Wildlife, continued (includes aquatic threatened and endangered species) ***Scope of Analysis: Changes in habitat features and populations of fish and aquatic wildlife.***	The aquatic habitat portion of the riparian objective might not be met if a large-scale mineral development occurs. Extraction of water for large-scale mining would reduce aquatic habitat for native fishes and aquatic wildlife and plants, including Gila topminnow, Gila chub, longfin dace, leopard frogs, Mexican garter snake, and Huachuca water umbel through sedimentation, excessive water use, and contamination. Construction for utilities might slightly to moderately disturb habitats of federally listed and other fish and aquatic wildlife and plants as mentioned above for mineral development. OHV designation should allow the aquatic habitat objective to be met and protect habitats of federally listed and other aquatic wildlife and plants mentioned above. But vehicles using 11 stream crossings could crush and therefore kill or injure animals, disturb habitats by sedimentation, lower water quality by leaking oil or other fluids, provide access for introduction of exotic species, destroy vegetation cover, and reduce bank stability. Current recreation management might disturb aquatic habitats and animals and plants. Increasing recreation use could reduce bank stability and vegetation cover along streams, promoting erosion and filling pool habitats. Extensive bank damage could adjust stream channels. Equestrian or hiking use could kill topminnows. Lack of an Arizona Trail designation would not affect fish and aquatic wildlife.	Fish and wildlife management proposals would place added emphasis on protecting and restoring aquatic fish and wildlife habitats and populations. Aquatic wildlife, including the desert pupfish, Gila topminnow, Gila chub, lowland leopard frog, and Chiricahua leopard frog, would be conserved by reintroductions and other management. Securing an instream flow right would help assure the sustainability of perennial water in Cienega Creek needed by aquatic species over the long term. Added restrictions on livestock and recreation use of riparian areas would protect aquatic species, including the special status species mentioned above. Reintroducing beaver would expand marsh habitats and increase aquatic habitat diversity. Cultural or visual resource management would not affect fish and aquatic wildlife. Eliminating the potential for mining on public land would greatly reduce the risk of harm to aquatic habitats described for Alternative 1. Utility corridor designation would eliminate most of the risk of direct impacts on fish and aquatic wildlife and plants from new utilities described for Alternative 1. Impacts of OHV designation would be the same as under Alternative 1, but eliminating all but one road stream crossing would alleviate the impacts on aquatic species described for Alternative 1. Recreation use in riparian areas including horseback riding and hiking, could increase injury or mortality to Gila topminnow, and harass or injure leopard frogs and garter snakes. Impacts to water quality, stream banks, and vegetation cover from recreational use could also disturb aquatic species. The Arizona Trail could contribute to these impacts by attracting more visitors. A recreation permit system would help ensure that use levels are compatible with maintaining aquatic habitats and populations of aquatic species.

Impacts From Alternative 3	Impacts From Alternative 4
Recreation management would affect fish and aquatic wildlife and plants much as under Alternative 2. But the Arizona Trail would cross the riparian area through the Narrows and allow direct impacts to fish and aquatic wildlife, including injury or death to Gila topminnow, harassment of leopard frogs, Gila chub, and Mexican garter snake, damage to vegetation cover, and trampling of stream banks.	Impacts from recreation management and the Arizona Trail would be the same as described for Alternative 2.

Table 2-32, continued. Comparison of Impacts, Las Cienegas Resource Management Plan

Resource Affected	Impacts From Alternative 1 (Current Management)	Impacts From Alternative 2 (Agency Preferred)
BIOLOGICAL RESOURCES		
Fish and Aquatic Wildlife, continued (includes aquatic threatened and endangered species) ***Scope of Analysis: Changes in habitat features and populations of fish and aquatic wildlife.***	Aquatic habitat components, including woody cover, undercut banks, average pool depth, and overhanging cover, are increasing under current livestock management with limited access to streams. Localized areas might experience trampling of vegetation and banks, lowering of water quality from fecal material, and for Gila topminnow the risk of ingestion by watering cattle. Lack of ACEC designation could deny important protective management to fish and aquatic wildlife.	Livestock grazing management would have impacts similar to those under Alternative 1. The expanded biological planning process should further help protect aquatic fish and wildlife through increased monitoring and improved watershed condition. ACEC designation would provide for important protective management to fish and aquatic wildlife and enhance resources for management and protection. ACEC Designation would provide protective management on a watershed scale which would benefit habitats for fish and aquatic wildlife.
Terrestrial Wildlife **(Includes terrestrial threatened and endangered species)** ***Scope of Analysis: Changes in habitat features and populations of terrestrial wildlife.***	Lack of integrated vegetation treatment over the long term would increase shrub-invaded grasslands and decrease open grassland habitats. Terrestrial wildlife preferring shrub grasslands, such as white-tail deer, would benefit. Habitat for species preferring open grassland, like pronghorn, Baird's and grasshopper sparrows, would decline. Current wildlife management, including threatened and endangered species consultations, studies, habitat improvement projects, and reestablishing species on a case-by-case basis, benefits terrestrial wildlife. Implementing conditions of biological opinions benefits jaguar, willow flycatcher, and lesser long-nosed bat. Cultural resource data recovery might disturb a small amount of terrestrial habitat. Management for VRM Class III might require stipulations that slightly increase wildlife project costs.	Vegetation treatments would tend to favor species that prefer open habitats and result in reduced occupation by species that favor dense cover usually found in mesquite or desert shrub habitat. Prescribed fires might destroy habitat in the short term and kill slow-moving species. Pronghorn would benefit from new growth after fires. Fires would also destroy some agaves, which are forage for endangered lesser long-nosed bats. Species such as Baird's sparrow and grasshopper sparrow would benefit unless nonnative species (such as Lehmann's lovegrass) increase. Actions to protect riparian areas would benefit riparian-dependent wildlife, including the endangered southwestern willow flycatcher and many sensitive species such as the yellow- billed cuckoo. Proposals for reestablishing or supplementing wildlife populations would benefit extirpated wildlife species such as the endangered aplomado falcon if actions are found feasible and are successful. Other wildlife management proposals would create a mosaic of habitats, protect sensitive areas, and facilitate wildlife movement. Cultural resource management would attract a higher level of human use to Empire Ranch headquarters and potentially to other parts of the planning area. More visitors could increase wildlife disturbance.

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Impacts From Alternative 3	Impacts From Alternative 4
Livestock grazing management would have similar direct impacts on fish and aquatic wildlife and plants as described for Alternatives 1 and 2. Cattle would continue to be excluded from streams, but would cause damage at crossing lanes and watering areas. Fixed stocking rates might degrade watershed condition during drought; increase runoff, flood peaks, and sedimentation; and decrease aquifer recharge and base flows affecting habitats of fish and aquatic wildlife and plants.	Eliminating livestock grazing on public land would affect fish and aquatic wildlife and plants in much the same way as the other alternatives. Livestock management under the other alternatives would virtually eliminate direct cattle impacts through riparian area exclosure. Alternative 4 would further eliminate impacts from crossing lanes and watering areas. Added improvements in watershed health might benefit aquatic habitats by slightly decreasing peak flows and sedimentation and increasing infiltration, aquifer recharge, and duration and length of perennial flow.
Although Alternative 3 would designate 90% less acreage in ACECs, most riparian areas that provide aquatic habitats would be included and protected by special management.	ACEC designation would affect fish and aquatic wildlife and plants the same as under Alternative 2.
Watershed, upland, riparian, wildlife, and cultural resource management would affect terrestrial wildlife the same as under Alternative 2.	Impacts of watershed, upland, riparian, wildlife, and cultural resource management, and mineral development would be as described for Alternative 2. Impacts on terrestrial species would be similar to those described for Alternative 2 except the potential to maintain habitat quality, reduce habitat loss, and maintain viable wildlife populations on public land in the planning area would be enhanced by removing livestock, designating only one utility corridor, and closing or restricting a larger proportion of roads (20%).

Table 2-32, continued. Comparison of Impacts, Las Cienegas Resource Management Plan

Resource Affected	Impacts From Alternative 1 (Current Management)	Impacts From Alternative 2 (Agency Preferred)
BIOLOGICAL RESOURCES		
Terrestrial Wildlife, continued **(Includes terrestrial threatened and endangered species)** ***Scope of Analysis: Changes in habitat features and populations of terrestrial wildlife.***	Potential mineral development on 6,373 acres would destroy or degrade oak woodland habitat, harming species such as Mearn's quail, white-tailed deer, and lesser long-nosed bat. Associated vehicles and human presence might disrupt or kill terrestrial wildlife In the long term proliferating rights-of-way might significantly disturb wildlife. Utility lines and access roads could block wildlife movement. Increased human use could result in mortality from vehicles, poaching, and habitat destruction. Off-highway vehicle use would disturb or destroy habitat, kill animals, promote poaching, and disturb wildlife use patterns. ORV might destroy some agaves essential to lesser long-nosed bats. Vehicles at the 11 stream crossings would destroy or disturb vegetation cover in riparian areas for about 1/4 mile up and down stream, harming willow flycatchers. Livestock would forage on 41,855 acres of oak woodland and grassland habitat, reducing cover and forage for grassland species. Trampling would further reduce cover, particularly around livestock developments. Habitat conditions would improve for species that benefit from increased bare ground. Livestock would consume some growing agave stalks, disturbing lesser long-nosed bat foraging habitat. Grazing of small areas of riparian habitat in crossing lanes and watering areas would harm willow flycatchers, as would livestock developments that attract cowbirds.	Continued closure of acquired lands to mining and proposed withdrawal of open areas would virtually eliminate the harm of mineral development to wildlife as described for Alternative 1. Designating two utility corridors would limit impacts described for Alternative 1 to a potentially much smaller area. Road designations and closing 14% of the road network would reduce motorized recreation impacts described for Alternative 1. Seasonal road closures would benefit pronghorn. Designating recreation zones would increase levels of human disturbance at designated sites in Zones 1 and 2. Camping-related disturbance would end in Zone 1. Dispersed recreation impacts would decline but would still occur on 90% of public land. A permit system would help ensure that recreation use is compatible with sustaining wildlife habitats and populations. Livestock would forage on 42,155 acres of oak woodland and grassland habitats and would affect wildlife as under Alternative 1. But flexible stocking rates and a more structured biological planning process should enhance wildlife management and better protect habitats. Grazing would still disturb the endangered southwestern willow flycatcher and lesser long-nosed bat as described for Alternative 1.

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Impacts From Alternative 3	Impacts From Alternative 4
Mineral development would affect wildlife as under Alternative 1, but harm could occur over a much larger area since 74% more acres would be open to mining for locatable minerals and 84% more acres would be open to mineral leasing. Designating utility corridors would have similar impacts as under Alternative 2, but impacts would occur in one added corridor. Designating and closing roads would have impacts similar to those described for Alternative 2 , but 8% instead of 14% of the road network would be closed. Added group sites and camp areas would increase impacts of human disturbance at these designated sites. But less acreage would be designated for dispersed use, so those impacts would occur on 63% of public land. Livestock would forage on 43,895 acres of oak woodland and grassland habitat and have similar impacts as described for Alternative 1. But in favorable or normal rainfall years, the impacts of reduced cover should be less due to conservative fixed stocking rates. In unfavorable drought years, loss of cover for wildlife and decline in vegetation condition could be greater than under Alternatives 1 and 2, where livestock numbers would be adjusted. Livestock grazing would still harm the endangered southwestern willow flycatcher and the lesser long-nosed bat as described for Alternative 1.	Dispersed recreation impacts would be most similar to Alternative 1 because Alternative 4 would include the most area in Zone 3. The endangered southwestern willow flycatcher and lesser long-nosed bat would still be affected, mainly by the impacts of recreation use.

Table 2-32, continued. Comparison of Impacts, Las Cienegas Resource Management Plan

Resource Affected	Impacts From Alternative 1 (Current Management)	Impacts From Alternative 2 (Agency Preferred)
BIOLOGICAL RESOURCES		
Noxious Weeds ***Scope of Analysis: Risk of invasion or spread of noxious weeds.***	Noxious weeds could be introduced from both concentrated and dispersed recreation and from livestock operations. Motor vehicles on roads could spread some noxious weeds.	Noxious weeds could be introduced from both concentrated and dispersed recreation and from livestock operations. Establishing a noxious weed control area would increase opportunities to acquire funding for control or eradication. Reduced miles of road for motor vehicle use would slightly reduce the risk of spreading certain noxious weeds. Integrated vegetation treatment, including prescribed fire, could help control some noxious weeds but spread others. BLM would consider these factors in project design and mitigation.
VISUAL RESOURCES		
Visual Resources ***Scope of Analysis: Changes in the quality of visual resource conditions in the viewshed.***	Future mineral or right-of-way development could degrade the planning area's current high scenic quality. Unauthorized off-road vehicle travel (wildcat roads), spread of concentrated and dispersed recreation impacts (bare ground, hardened areas) and some livestock developments could also lower scenic quality. Current watershed restoration projects could lower scenic quality in the short term but would improve scenic quality over the long term. Applying VRM Class III standards to all developments and projects would help protect scenic quality.	Current high scenic quality would be retained by closure to mineral development, designating corridors along existing utility lines, implementing a designated road system, and restricting camping in Zones 1 and 2. Proposed watershed restoration projects, including vegetation treatments, could lower scenic quality in the short term but improve scenic quality over the long term. Applying VRM Class II standards to all developments and projects would increase protection of scenic quality from that under Alternative 1.

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Impacts From Alternative 3	**Impacts From Alternative 4**
Impacts would be the same as under Alternative 2.	Impacts would be the same as under Alternative 2, but the removal of livestock would reduce one risk factor in introducing or spreading noxious weeds. Further reduction in miles of roads for motor vehicle use would slightly reduce the risk of spreading certain noxious weeds compared to Alternative 2.
Current high scenic quality could be lowered by mineral development outside ACECs. Current high scenic quality would be retained by designating corridors along existing utility lines and implementing a designated road system and restrictions on camping in Zones 1 and 2. Applying VRM Class II standards to all developments and projects would increase protection of scenic quality from that under Alternative 1.	Current high scenic quality would be retained by closures to mineral development, designating corridors along existing utility lines, removing livestock grazing and developments from public land, and restricting camping in Zones 1 and 2. Increased fencing would slightly degrade visual resources. Applying VRM Class II standards to all developments and projects would increase protection of scenic quality from that under Alternative 1.

Table 2-32, continued. Comparison of Impacts, Las Cienegas Resource Management Plan

Resource Affected	Impacts From Alternative 1 (Current Management)	Impacts From Alternative 2 (Agency Preferred)
CULTURAL AND PALEONTOLOGICAL RESOURCES		
Cultural and Paleontological Resources ***Scope of Analysis: Potential for disturbance to or for increased protection of cultural and paleontological resources resulting from proposed actions.***	Current watershed, vegetation, and wildlife management provides limited and localized benefits to cultural resources from restoration and/or management activities. Current management of visual resources (VRM Class III) allows some undesirable visual intrusions at historic ranch headquarters. Current cultural resource management provides basic stabilization and limited protection of cultural resources. Class III surveys and ethnoecology study would enhance knowledge base. Providing Native American plant collecting sites meets a need. Continued closure of most public land to mining would protect cultural resources. Mining impacts from small acreages open to mining could be mitigated. Lack of designated utility corridors could disturb cultural resources over a wide area, but data recovery could mitigate impacts. Unauthorized off-road travel by vehicles seriously threatens cultural resource sites. The threat of illegal collecting of cultural and paleontological resources is enhanced by the existing road network, which provides access to sites. Class III surveys along roads would help assess threats. Lack of recreation zones would disturb cultural resources through unregulated, dispersed recreation.	Proposed watershed, vegetation, and wildlife management would improve plant cover, better protecting cultural sites. Restrictions on uses in riparian areas would benefit cultural resources, which are concentrated in these areas. Management of visual resources under Class II would protect and enhance scenic quality of historic ranch headquarters. Cultural resource management that provides basic stabilization and adaptive reuse would give the public and scientific community a wide array of educational, interpretive, and research opportunities at the Empire Ranch headquarters and sites outside the headquarters area. Class III surveys and ethnoecology studies would enhance the knowledge base. Providing Native American plant collecting sites meets a need. Designated utility corridors would restrict cultural resource impacts from ground disturbance to limited areas. Disturbance could be mitigated by data recovery. Unauthorized off-road travel by vehicles could be better enforced by fully implementing a designated road system. Proposed road restrictions and closures would protect some cultural sites and slightly reduce the threat of illegal collecting of cultural and paleontological resources The Arizona Trail designation could disturb cultural resources by providing non-motorized access into new areas. Data recovery could mitigate Impacts. Designating recreation zones would protect cultural resources in Zones 1 and 2 from most concentrated use because activities would be restricted to designated sites where impacts could be mitigated.

Impacts From Alternative 3	Impacts From Alternative 4
Impacts would be the same as under Alternative 2 with the following exceptions:	Impacts would be the same as under Alternative 2 with the following exceptions:
Opening the planning area to mining outside ACECs could inflict major harm to cultural resources. These impacts would have to be mitigated through mining plans of operations.	The impacts from livestock grazing and developing range projects would be eliminated.
Smaller ACECs would still protect cultural resources, which are concentrated along riparian areas within the ACECs.	Additional roads would be closed and restricted, further reducing the impacts of motorized recreation.

Table 2-32, continued. Comparison of Impacts, Las Cienegas Resource Management Plan

Resource Affected	Impacts From Alternative 1 (Current Management)	Impacts From Alternative 2 (Agency Preferred)
CULTURAL AND PALEONTOLOGICAL RESOURCES		
Cultural and Paleontological Resources continued ***Scope of Analysis: Potential for disturbance to or for increased protection of cultural and paleontological resources resulting from proposed actions.***	Livestock grazing would inflict only limited damage to cultural resources because livestock would be fenced from riparian areas where cultural resources are concentrated. Lack of ACEC designations would preclude management prescriptions that might benefit cultural and paleontological resources.	Livestock grazing impacts would be same as under Alternative 1. ACEC designation would protect cultural resources through associated actions to protect vegetation and wildlife.
LAND USES		
Lands and Realty ***Scope of Analysis: Impacts on the ability to permit land use authorizations and provide services.***	No utility corridors would be designated for new applications. BLM would consider locations and applications on case-by-case basis. Protecting sensitive resources, including threatened and endangered species and cultural sites, might preclude project approvals or locations or require stipulations that increase project costs.	Two designated utility corridors could be used for new applications. Such use might reduce some of the conflicts relating to cultural properties and sensitive or listed plants or animals. Protecting sensitive resources, including threatened and endangered species and cultural sites, might preclude project approvals or locations or require stipulations that increase project costs. Reintroducing species could require more stipulations. Vegetation treatments, including prescribed fire, could harm right-of-way facilities and preclude land use authorizations. Protective measures would need to be applied. Motorized recreation use along utility easements could result in conflicts with permit holders. The construction and use of the Arizona Trail and use of other non-motorized routes could result in conflicts where the trail crosses existing access routes for utilities and other land use permit sites.

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Impacts From Alternative 3	Impacts From Alternative 4
see page 2-157	see page 2-157
Impacts would be the same as under Alternative 2 except three designated utility corridors could be used for new applications.	Impacts would be the same as under Alternative 2 except only one designated utility corridor could be used for new applications.

Table 2-32, continued. Comparison of Impacts, Las Cienegas Resource Management Plan

Resource Affected	Impacts From Alternative 1 (Current Management)	Impacts From Alternative 2 (Agency Preferred)
LAND USES		
Mineral Development ***Scope of Analysis: Acreage open to potential mineral exploration and development.***	48,542 acres of public land would remain closed to mineral location and mineral leasing. 458 acres of public land and 5,914.6 acres of split-estate lands would remain open to mineral location and mineral leasing. 49,000 acres of public land and 5,914.6 acres of split-estate lands would be closed to mineral material sales. About 88% of the federal mineral estate in the planning area would be closed to mineral location and leasing. Overall, about 40% of planning area prospectively valuable for oil and gas would be open, and 60% would be closed. Planning area includes about 0.5% of area in southeast Arizona that is prospectively valuable for oil and gas.) Overall, 65% of the planning area would be open to mining either on federal mining claims or state leases, and 35% would be closed.	Same as under Alternative 1 but 458 more public domain acres and 5,914.6 more split-estate acres would be proposed to be withdrawn from mineral location and leasing. A 12% reduction in public land open to mineral leasing and location. Overall, about 30% of planning area (federal and state) prospectively valuable for oil and gas would be open and 70% would be closed. Only State Trust Lands in the planning area would potentially be open to mining of locatable minerals.

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Impacts From Alternative 3	Impacts From Alternative 4
41,000 acres of public land and 5,914.6 acres of split-estate lands would be open to mineral location and mineral material sales outside ACECs. 45,859 acres of public land and 5,914.6 acres of split-estate lands would be open to mineral leasing with the stipulation of no surface occupancy within ACECs. An 84% increase in federal lands open to mineral leasing and a 74% increase in federal lands open to mineral location in the planning area. Overall, about 96% of planning area (federal and state) prospectively valuable for oil and gas would be open and 4% would be closed. Overall, about 95% of planning area (federal and state) would be open to mining.	Acreage open to potential mineral exploration and development would be the same as under Alternative 2.

Table 2-32, continued. Comparison of Impacts, Las Cienegas Resource Management Plan

Resource Affected	Impacts From Alternative 1 (Current Management)	Impacts From Alternative 2 (Agency Preferred)
LAND USES		
Livestock Grazing ***Scope of Analysis: Acreage open to livestock grazing, allowable use levels, and other constraints.***	BLM would continue to authorize livestock grazing on 41,855 public land acres. Four grazing allotments would continue to operate. The Empire-Cienega allotment would have variable net cash returns, resulting in part from the variable stocking rate and resulting in variable grazing receipts to BLM. Protection of sensitive resources, including riparian areas, special status wildlife and plants, and cultural resources, might constrain grazing management and increase operating costs. Improvements in upland vegetation condition from vegetation treatments would be localized and unlikely to measurably increase forage base. Unmanaged increases in recreation use would threaten viability of livestock operations and require increased labor and capital outlay from ranchers. Direct human-livestock conflicts eventually could end the viability of grazing operations. Over the long term, less grazing land (State Trust and private) might be open to livestock operations due to shifts from a rural agriculture-based economy to residential and service-related ecotourism economy.	BLM would authorize livestock grazing on 41,155 public land acres. Four grazing allotments would continue to operate, and one new allotment would be established in the Empire Mountains. All allotments would have variable net cash returns resulting in part from variable stocking rates and resulting in variable grazing receipts to BLM. A new grazing allotment in the Empire Mountains could generate personal income of more than $1,700 and $300 in grazing receipts to BLM. Protection of sensitive resources, including riparian areas, special status wildlife and plants, and cultural resources, might constrain grazing management and increase operating costs. Reintroduced species might additionally constrain grazing management. Improvements in upland vegetation condition from integrated vegetation treatments are likely to increase the forage base over the long term. Increased recreation use would threaten the viability of livestock operations, and livestock and visitors would directly conflict. But proposed recreation management and use of the biological planning process should reduce and resolve these conflicts and improve prospects for maintaining viable grazing operations. Some road closures or restrictions might slightly lower the efficiency of grazing operations. Conflicts might temporarily increase in areas of designated recreation sites or the Arizona Trail. Acquisitions of more public land or conservation easements might help ensure that more grazing land is open to grazing operations for a longer period.

Impacts From Alternative 3	Impacts From Alternative 4
Same as Alternative 2 except for the following: BLM would authorize Livestock grazing on 45,095 public land acres. Allotments would have lower but set stocking rates. Therefore net cash returns would be more stable. Over the long term, income from operations might be lower on average. A new grazing allotment in the Empire Mountains could generate $300 in grazing receipts to BLM and personal income exceeding $1,700. To resolve conflicts between users BLM would apply more traditional methods instead of the biological planning process.	BLM would not allocate public land for livestock grazing. Four federal grazing leases would be cancelled, affecting operations on four ranches. More than $129,000 in personal income could be lost. No federal grazing receipts would be received on the four allotments. BLM might have to compensate ranchers for the value of improvements that they would no longer use. Increasing recreational use would continue, but livestock operations would no longer conflict with visitors on public land. Over long term, less grazing land (State Trust and private) might be open to other livestock operations surrounding these public lands because of shifts from a rural agriculture-based economy to a residential and service-related ecotourism economy.

Table 2-32, continued. Comparison of Impacts, Las Cienegas Resource Management Plan

Resource Affected	Impacts From Alternative 1 (Current Management)	Impacts From Alternative 2 (Agency Preferred)
	LAND USES	
Recreation ***Scope of Analysis: Changes in recreation opportunity settings ; corresponding changes in recreation experiences and changes in access.***	Existing recreation settings would be adversely affected by the following: • Lack of planned and integrated vegetation management. • Management as VRM Class II, which allows some changes to existing landscape character. • Deterioration of historic buildings, which leads to loss of site character. • Lack of a comprehensive cultural resource interpretation program. Current wildlife management enhances recreation opportunities and settings. Mineral development on public land now open to mining could result in loss of more primitive recreation experiences and scenic qualities and changes in visitor access. Utility rights-of-way and land use authorizations on public land could change current recreation opportunities and visitor access. Both uses could result in subsequent increases in motorized traffic, increases in the use of unauthorized public land access points, changes in some road conditions, and increases in road maintenance requirements. Current off-highway vehicle management has disturbed the natural and more primitive recreation settings and opportunities because of the harm of unauthorized off-road travel. Lack of designated recreation zones and associated management allows for continual random campsite creation and dispersed recreational use on the entire planning area, harming both recreation settings and opportunities for some users in some areas. Management is complicated by lack of established desired recreation settings and opportunities. Over the long term, all visitor opportunities and experiences might change with increased, relatively unplanned recreation use.	Proposed actions for watershed, upland, riparian, fish and wildlife, and cultural resource management would enhance overall recreation settings and opportunities. Specific proposals would both harm and benefit recreation opportunities and settings. Designation as VRM Class II would help maintain the desired recreation opportunities and settings, including a more natural appearing and primitive recreation setting. Complying with VRM Class II prescriptions would restrict or modify some recreation developments. Potential impacts from mineral development would be eliminated and impacts from utility rights-of-way would be confined to two corridors. Implementing OHV designation and transportation system would create a wider variety of both motorized and no-nmotorized recreation opportunities and reduce user conflicts. Establishing an individual recreation permit system would help preserve existing recreation settings and opportunities by addressing the area's recreation capacities. The proposed recreation zone prescriptions would help maintain recreation settings and enhance recreation opportunities.

Impacts From Alternative 3	Impacts From Alternative 4
Same impacts as Alternative 2 from watershed, riparian and upland vegetation, fish and wildlife, and cultural resource management and from VRM Class II designation. Impacts from mineral development would be the same as described for Alternative 1 but could occur on a much larger scale. Impacts of utility rights-of-way would be similar to those under Alternative 2 but would be expanded into another corridor. Impacts of off-highway vehicle management would be the same as under Alternative 2. Recreation impacts would be similar to those described for Alternative 2 except that the Zone 2 and 3 configuration would maintain a more natural or primitive corridor on the main touring road heading northeast through the planning area. Since camping along the road corridors in an expanded Zone 2 would not be allowed unless at a designated spot, negative impacts along the roadside would decline. An overall high visual quality and sense of being in a more primitive area would be maintained.	Impacts would be the same as under Alternative 2 except for the following: Impacts of utility rights-of-way would be confined to one corridor. No exclusively non-motorized routes would be created. That all routes would be shared motorized and non-motorized use would likely increase user conflicts. Desired recreation settings might be harder to maintain if visitor use increases dramatically because most of the area is prescribed for dispersed recreation use and the least amount of area is in the more restrictive Zones 1 and 2 (designated camp areas, group areas, and pullouts for example).

Table 2-32, continued. Comparison of Impacts, Las Cienegas Resource Management Plan

Resource Affected	**Impacts From Alternative 1 (Current Management)**	**Impacts From Alternative 2 (Agency Preferred)**
Recreation, continued ***Scope of Analysis: Changes in recreation opportunity settings ; corresponding changes in recreation experiences and changes in access***	Lack of an Arizona Trail designation means that a highly desired non-motorized trail would not be routed on public land in the planning area and another route would have to be found. The trail would also not attract an increasing number of visitors to the planning area. Livestock grazing has relatively little impact on recreation. Safety and health issues could arise when cattle and visitors use the same areas. Depending on visitor perspectives, cattle could either detract from or add to recreational experiences. Visitors often use livestock developments, including cattle trails, water sources, and corrals. Lack of more ACEC designations might slightly lower the quality of the recreation opportunity settings because sensitive resources might be at greater risk of degradation.	Designating a corridor for the Arizona Trail would provide a highly desired non-motorized trail and help reduce user conflicts on shared motorized and non-motorized routes. The trail would attract increasing numbers of visitors to the area. Grazing impacts would be similar to those under Alternative 1 except that users would be brought into the biological planning process, which should help reduce conflicts. ACEC designation would help maintain primitive and semiprimitive recreation opportunities and settings by maintaining and protecting sensitive resources in these areas.
SPECIAL DESIGNATION AREAS		
Wild and Scenic Rivers ***Scope of Analysis: Impacts to the resources and character of the wild and scenic river study area.***	Existing watershed, vegetation, fish and wildlife, and cultural resource management would continue to protect the wild and scenic river study area and values. A Class III VRM designation could allow for some intrusions on the current scenic values of Cienega Creek. Disturbance from any large-scale mining in the Empire Mountains could degrade wild and scenic river values and would be mitigated through the required mining plans of operations. Rights-of-way in the wild and scenic river corridor could degrade outstandingly remarkable values. Continuing use of all existing roads might degrade portions of Cienega Creek where vehicle traffic is now being allowed in the wild and scenic river corridor.	The overall prescriptions for watershed, upland, and riparian areas would help retain Cienega Creek in wild and scenic river suitability status. Overall the cultural resource program would enhance wild and scenic river values. The more stringent VRM Class II designation would better maintain values of the river study area. Proposed mineral withdrawals and continued closure of most of the planning area to mineral development would protect wild and scenic river values. Designating utility corridors away from the wild and scenic river corridor would help maintain wild and scenic river values. But the proposed utility corridor in the northeast corner of the planning area would cross the Cienega Creek wild and scenic river corridor, and other lines within this corridor could degrade the scenic values of the wild and scenic river study area. Implementing the designated road system would reduce the potential for expanding illegally created roads and help maintain wild and scenic river values. Proposed road closures would reduce unneeded roads in the wild and scenic river corridor and eliminate almost all wet stream crossings.

Impacts From Alternative 3	**Impacts From Alternative 4**
Impacts of the Arizona Trail would be the same as under Alternative 2. Livestock grazing impacts would generally be similar to those described for Alternatives 1 and 2. But negative impacts to recreation settings could increase in drought years if stocking rates are not reduced. Impacts to the recreational settings could include bare soil in camping areas. Designating ACECs would have the same impacts as under Alternative 2.	Because the Arizona Trail would be shared use, motorized and non-motorized user conflicts would increase Removal of livestock grazing might increase recreation use. Although conflicts from cattle grazing would decline, conflicts between equestrians and other users would remain. Corrals, water sources, and trails created by cattle might remain and be used by visitors, but BLM would assume maintenance costs. Equestrian impacts could replace livestock grazing impacts on a smaller scale with higher impacts concentrated in popular areas. Increased opportunities for livestock-related and general special recreation permits would result.
Impacts would be the same as under Alternative 2 with the following exceptions: Mineral development impacts would be of the same type as under Alternative 1 but could occur over a much greater area. Recreation impacts would be similar to those under Alternative 2, but some of the wild and scenic river corridor would fall in recreation Zone 2, which might better protect wild and scenic river values by restricting camping to designated areas. But because Alternatives 2, 3, and 4 would all restrict camping to areas more than 100 feet from the stream, the increased protection would be minor. The Arizona Trail corridor would pass through the wild and scenic river corridor and might conflict with maintaining wild and scenic river values in the segment crossing through the Narrows.	Impacts would be the same as under Alternative 2 except for the following: Eliminating livestock grazing in the river corridor would benefit wild and scenic river values, but recreational livestock use might increase and have impacts similar to livestock grazing.

Table 2-32, continued. Comparison of Impacts, Las Cienegas Resource Management Plan

Resource Affected	Impacts From Alternative 1 (Current Management)	Impacts From Alternative 2 (Agency Preferred)
SPECIAL DESIGNATION AREAS		
Wild and Scenic Rivers, continued ***Scope of Analysis: Impacts to the resources and character of the wild and scenic river study area.***	Lack of recreation management zones would not affect the character of the wild and scenic river corridor or its outstandingly remarkable values. Lack of designation of a route for the Arizona Trail would prevent attracting a cumulatively large number of hikers to the river corridor. Restricting cattle from most of the wild and scenic river corridor would help protect wild and scenic river values. Use of livestock crossing lanes and watering areas would cause some harm to wild and scenic river values. Lack of an ACEC designation should not affect a stream's suitability because wild and scenic river interim management guidelines already protect the study corridor's values and character.	The recreation Zone 3 designation recommended for the wild and scenic river study corridor would allow dispersed camping, but Alternatives 2, 3, and 4 would ban camping within the riparian zone. Despite this restriction, wild and scenic river segments within Zone 3 might be degraded by dispersed recreation use, including human waste accumulation, lowered water quality, and extensive tree damage. The lack of alternate potable water sources could have cumulative impacts to the creek where hikers and horseback riders trample vegetation to retrieve water. Designating the Arizona Trail could increase visitor use and adverse impacts. Livestock Grazing impacts would be the same as under Alternative 1. The ACEC designation would add a layer of importance, perhaps pulling in more management dollars to the area and helping retain wild and scenic river values.
ACECs ***Scope of Analysis: Impacts to the resources of the ACEC s.***	For all alternatives, see the impacts to watershed, upland and riparian vegetation, and fish and wildlife for the impacts to the resources of the Appleton-Whittell ACEC. The resources and research use of Appleton-Whittell ACEC are being protected through implementation of the proposed management for this ACEC prescribed in the Phoenix RMP and through the existing cooperative management agreement.	Changing the name of Appleton-Whittell ACEC to Appleton-Whittell Research Natural Area ACEC would better communicate the main purpose of the ACEC. Restricting all roads on public land in the ACEC to administrative use would ensure that unauthorized motor vehicle use does not interfere with ongoing research.

Impacts From Alternative 3	Impacts From Alternative 4
See page 2-167.	See page 2-167.
Impacts would be the same as under Alternative 2.	Impacts would be the same as under Alternative 2.

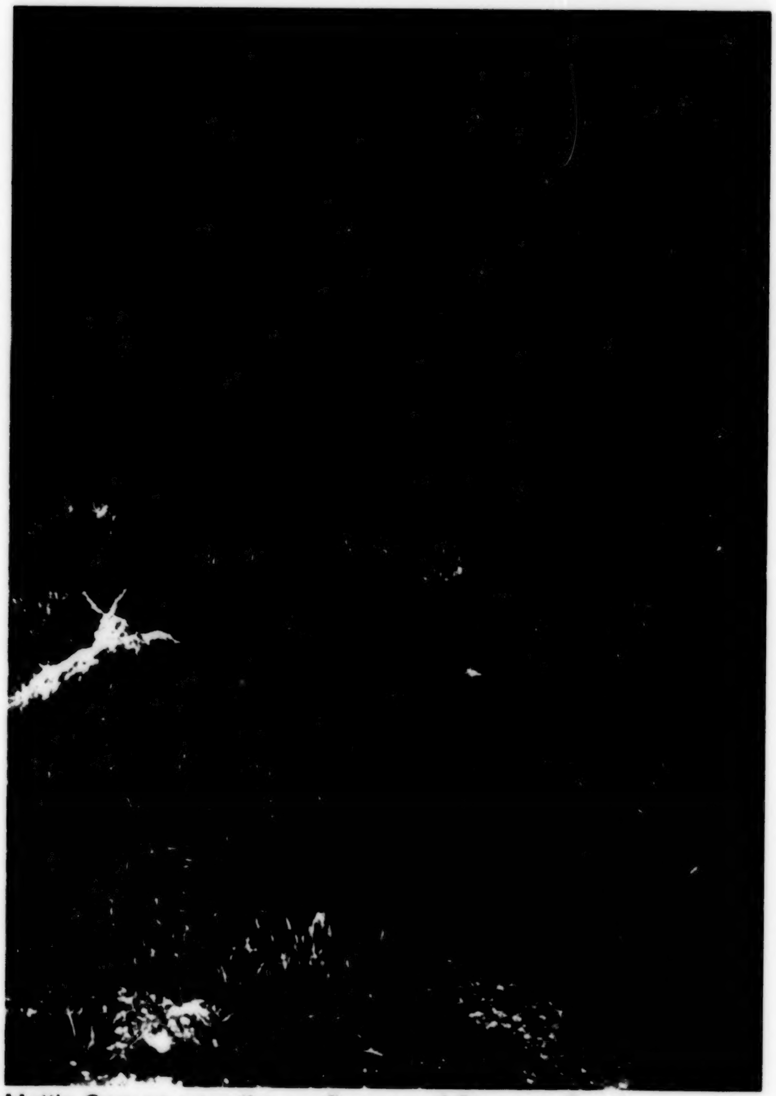
Table 2-32, concluded. Comparison of Impacts, Las Cienegas Resource Management Plan

Resource Affected	Impacts From Alternative 1 (Current Management)	Impacts From Alternative 2 (Agency Preferred)
SOCIAL AND ECONOMIC CONCERNS		
Population and Demographics	Population or demographics would not change.	Increased recreation resulting from changes in recreation management would increase the number of visitors to the planning area but not the population and demographics of Pima, Cochise, and Santa Cruz counties.
Local and Regional Economy	The local or regional economy would not change.	Increased recreation resulting from changes in recreation management might benefit the local and regional economy.
Employment	Employment would not change.	Increased recreation might result in more local jobs.

Impacts From Alternative 3	**Impacts From Alternative 4**
Impacts would be the same as under Alternative 2.	Impacts would be the same as under Alternative 2.
Impacts would be the same as under Alternative 2.	Increased recreation resulting from changes in recreation management might benefit the local and regional economy but would result in a loss of $129,000 in personal income.
Impacts would be the same as under Alternative 1.	Impacts would be the same as under Alternative 1.

CHAPTER 3

AFFECTED ENVIRONMENT



Mattie Canyon near the confluence of Cienega Creek.

CHAPTER 3
AFFECTED ENVIRONMENT

INTRODUCTION

Chapter 3 describes the Empire-Cienega Planning Area's physical, biological, social, and economic characteristics that would be affected by implementing any of the alternatives described in Chapter 2. This description is a baseline for analyzing and determining impacts of the alternatives.

SETTING

The Empire-Cienega Planning Area is a unique, scenic area of rolling desert grasslands and woodlands in a high-desert basin between the Santa Rita and Whetstone mountains. Located along a scenic highway within an hour of the rapidly growing Tucson metropolitan area, the planning area offers outstanding dispersed recreation opportunities but is also highly vulnerable to the impacts of growth. In addition to Tucson, the planning area is readily accessible from the nearby towns of Sonoita, Patagonia, Benson, and Sierra Vista. Access into the area is provided by dirt roads connecting with State Highways 82 and 83.

The planning area encompasses most of a critical watershed that is important to Tucson for flood control and aquifer recharge. The area also includes five of the rarest habitat types in the American Southwest: cienegas, cottonwood-willow riparian areas, sacaton grasslands, mesquite bosques, and semidesert grasslands. In addition, the planning area contains habitat for several endangered species, a site on the National Register of Historic Places, two proposed wild and scenic river segments, and scenic open space.

The planning area encompasses 266 mi^2 (170,558 acres) in southeast Arizona roughly bounded by Interstate 10 on the north, Arizona State Highway 83 on the west, the Whetstone Mountains on the east, and the Canelo Hills on the south (Map 1-4). Table 3-1 summarizes the acres by ownership within the planning area.

Table 3-1. Land Ownership, Empire-Cienega Planning Area

Land Ownership	Acres	Percentage
BLM	48,956	28.7
State of Arizona	80,706	47.3
Private	40,896	24.0
TOTAL	**170,558**	**100.0**

PHYSICAL RESOURCES AND PROCESSES

AIR RESOURCES

Under the National Ambient Air Quality Standards (NAAQS), the air quality rating for the BLM-administered lands within the Empire-Cienega Planning Area is Class II. No Class I areas fall within or are contiguous with the planning area. In cooperation with the National Park Service and the Forest Service, Arizona has established the Interagency Monitoring of Protected Visual Environments Program (IMPROVE), which is monitoring all but 2 of the 12 Class I airsheds in the state for changes in visibility. Two airsheds

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relatively near Sonoita are among the 12: Saguaro National Park and Chiricahua National Monument. But the Saguaro National Park monitoring is on the west side of Tucson, and the Chiricahua National Monument monitoring has not been in place long enough to detect any trends in visibility.

Even without this trend data one can reasonably extrapolate the general air quality of the planning area. None of the county and city monitoring sites in Pima and Santa Cruz counties exceeded standards in 1996 or 1997 (the latest published data). Pollutants measured and within standards included the following:

- Carbon monoxide (1- and 8-hour averages at four sites in Tucson only); lead (quarterly averages at two Tucson sites and one Nogales site).

- Ozone (1-hour average at Saguaro National Park East and five Tucson sites, including Houghton Road near Interstate 10, the nearest site to the planning area).

- Nitrogen dioxide (annual average at only one site in Tucson).

- PM^{10} (inhalable particulate matter) (24-hour average at 17 Tucson sites, including two on South Houghton Road and one in Nogales).

Neither the nine Pima County sites (including the site at South Houghton Road and Interstate 10) nor the one Santa Cruz County site exceeded the 98th percentile standard for $PM^{2.5}$ (fine particulate matter). Although none of the readings can be assumed to apply beyond their sites' immediate vicinities, one can reasonably assume that no sources in the Sonoita Valley are likely to produce higher readings under similar conditions. Air quality in the Sonoita Valley is good and in full attainment with the Clean Air Act and existing air quality standards. No restrictions have been placed on or are foreseen for discharges due to existing air quality.

GEOLOGY

The Empire-Cienega Planning Area lies within the Basin and Range physiographic province, a region of north-trending mountain ranges separated by wide basins. The area is mainly within the Cienega Basin, which is bordered on four sides by fault-block mountain ranges: the Santa Rita Mountains to the west, Empire Mountains to the north, Whetstone Mountains to the east, and Canelo Hills to the south. These mountains consist of Paleozoic marine sediments and Mesozoic sedimentary and volcanic rocks intruded by Laramide-age granitic intrusive rock. The Cienega Basin is filled with alluvial material eroded and transported from these surrounding mountains. The alluvium overlies sedimentary rocks of the Cretaceous Bisbee Group. Its maximum thickness is around 1,000 feet as extrapolated from drill hole data.

SOIL RESOURCES

The properties of the soils vary widely because of the following:

- Environmental conditions under which soils were formed.

- Parent material from which they were formed.

- Current environmental conditions.

The dominant soils are Orthents, Argids, and Fluvents, which have a thermic temperature regime and mostly an aridic moisture regime. Shallow Torriorthents (Cellar, House Mountain, Lampshire, Mabray, and Tidwell series) and

Haplustolls (Faraway and Tortugas series) are found in areas of rock outcrop in the planning area's hills and mountains. In the valleys, Haplargids (White House, Bernardino, Sonoita, and Caralampi series), and Torrifluvents (Gila, Glendale, Anthony, Pima, Grabe, and Comoro series) are dominant.

Soils are described in detail in the two soil surveys covering the planning area:

> AZ667 - Santa Cruz County, and parts of Cochise and Pima Counties (Richardson and others 1979)
>
> AZ669 - Eastern Pima County - Unpublished (NRCS 1993)

The deep clay and loamy soils immediately next to portions of Cienega Creek and some of the major tributaries are highly susceptible to gully erosion and soil piping. One such area, lower Wood Canyon, has severe gully erosion and piping on more than 200 acres. Several areas have large active gullies and deep holes resulting from continuing soil movement. In 1993 a large flood (>100-year flood) scoured Cienega Creek, creating a 5-foot-deep headcut south of Spring Water Canyon. This headcut was stabilized in 1994. Monitoring results show that this erosion has ceased and the site is healing.

WATER RESOURCES

Precipitation and Climate

The variability of rainfall in the planning area is extreme. Precipitation varies from a high of more than 25 inches per year in the Santa Rita Mountains to a low of 15 inches in the lower valley locations. About 65% of the moisture occurs as summer thunderstorms (Sellers and Hill 1974). These monsoon rains usually begin in July and continue into September. The spring months (April, May, and June) and fall months (October and November) are normally dry. Summer temperatures may reach as high as 100°F but are generally lower. Minimum winter temperatures occur in January and can be expected to fall below 29°F.

Watersheds

The public lands in the planning area are located in two basins: the Cienega Creek basin and the Babocomari River basin (Map 3-1). Cienega Creek begins in the Canelo Hills at Papago Spring and runs northward to Pantano Wash, a tributary to the Rillito River in Tucson. The basin area is 228.2 mi^2 (146,038 acres). Table 3-2 summarizes the acres by ownership within the upper Cienega Creek watershed. Table 3-3 shows major Cienega Creek tributaries that drain from the Santa Rita, Whetstone, and Empire mountains. The upper basin ends at a geologic constriction known as the Narrows.

Public lands south of State Highway 82 on the Appleton-Whittell Research Ranch and the Rose Tree Ranch are at the headwaters of the Babocomari River drainage and include portions of Post and O'Donnell canyons.

Between 1974 and 1999 BLM and the University of Arizona collected watershed data that show that the planning area's watersheds are in satisfactory condition with adequate cover and a stable trend (Table 3-4). Overall, the watersheds exhibit a low susceptibility to erosion due to the high amount of coarse fragments in the surface and the existing vegetation cover.

Past activity has altered soil and water resources. The segment of Cienega Creek next to the Cienega Ranch was altered for farming in the 1970s. A drag line dug a canal to divert large flood flows around the Cienega Creek

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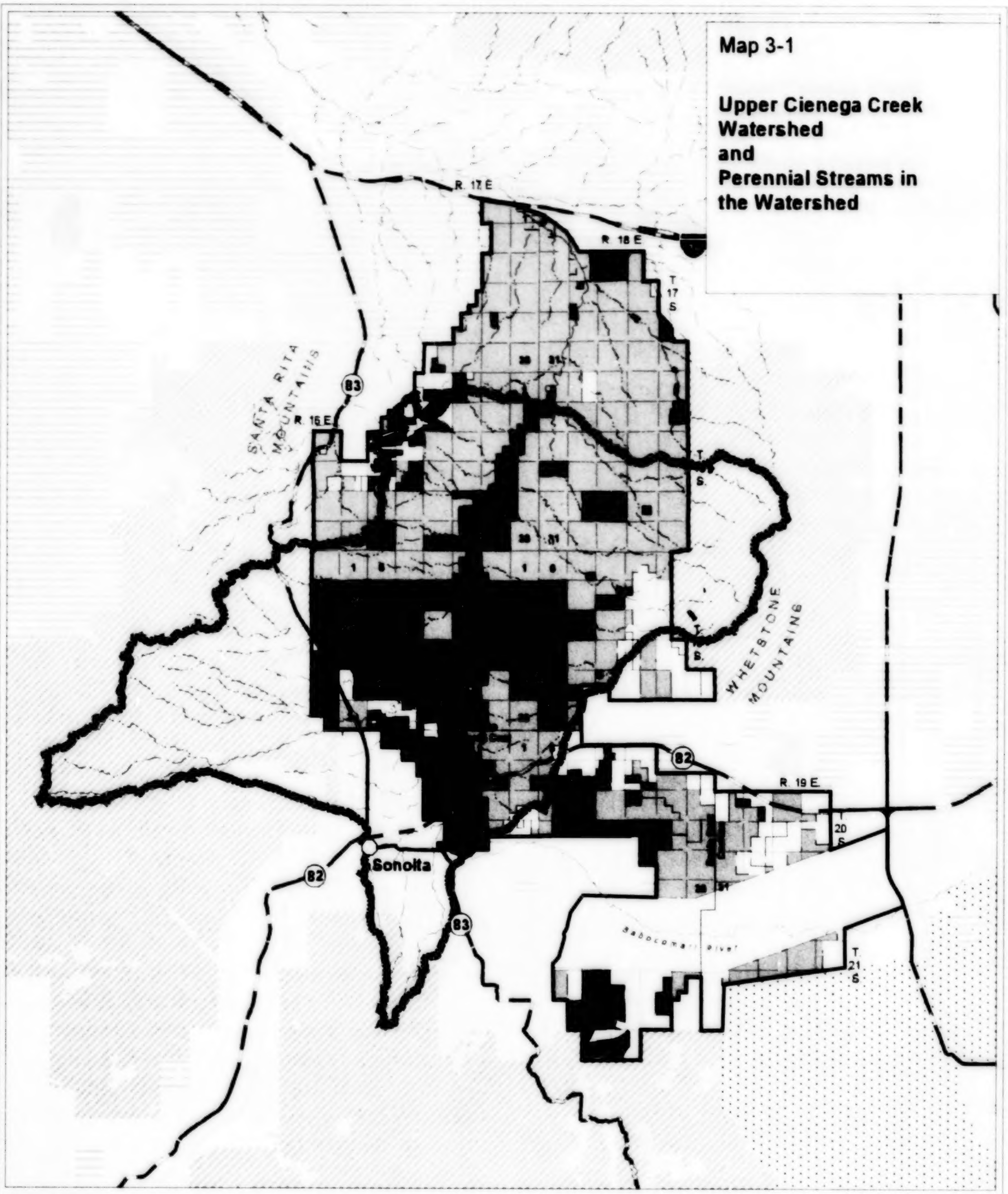

Map 3-1

Upper Cienega Creek Watershed and Perennial Streams in the Watershed

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RESOURCE MANAGEMENT PLAN

2 0 2 4 Miles

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LEGEND
- — Planning Area Boundary
- ▬ Watershed Boundary
- - · - Intermittent Stream
- ━ Perennial Stream
- ■ BLM Land
- ▨ National Forest Land
- ⁚ Military Land
- ▒ State Land (Inside Planning Boundary)
- ☰ State Land (Outside Planning Boundary)
- ☐ Private Land

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Table 3-2. Land Ownership, Upper Cienega Creek Watershed

Ownership	Acres	Square Miles	% of Total
BLM	40,165.7	62.8	27.5
USDA Forest Service	42,667.1	66.7	29.2
State	39,595.7	61.9	27.1
Private	23,610.2	36.9	16.2
TOTAL	**146,038.7**	**228.2**	**100.0**

Table 3-3. Major Tributaries of Cienega Creek

Source	Tributaries
Santa Rita Mountains	Gardner Canyon, Empire Gulch, Oak Tree Canyon, North Canyon
Empire Mountains	Fortynine Wash, Stevens Canyon, Sanford Canyon, Pump Canyon
Whetstone Mountains	Mud Spring Canyon, Spring Water Canyon, Mattie Canyon, Wood Canyon, Fresno Canyon, Apache Canyon.

Table 3-4. Summary of Watershed Condition Data, Empire-Cienega Planning Area, Average Values

Source	UA[2]–1974	BLM–1989	UA–1991	BLM–1995	BLM–1997	BLM–1999
% Bare Ground	17	21	20	28	33	28
% Gravel/Rock	34	24	23	28	25	22
% Vegetation	49	55	57	44	42	50
Rating[1]	S	S	S	S	S	S

[1] S = Satisfactory condition, which is based on 35% or less bare ground and the absence of active erosional features.

[2] UA = University of Arizona.

bottomlands that were cultivated. This canal bisected a marsh, draining a large portion of its surface water. Today this marsh exists as an altered remnant near the Cienega Ranch. Over the years the unlined canal has eroded, leaving 20-foot-high banks in some places. Below a concrete ford that serves as a control to channel adjustment, the canal has widened to more than 100 feet and deepened to more than 20 feet. More erosion is evident with each large flood. Where the canal diversion begins, deposition began to fill the now intermittent Cienega Creek channel, and scouring deepened the canal, diverting into it base flows of Cienega Creek.

Also during the 1970s three dikes were installed next to the farmed bottomlands for pumping irrigation water. These dikes backed up water but have largely filled with sediment over the years. Normal hydrologic function was restored in 1998 along this 1.4-mile segment of Cienega Creek, which had been modified for agriculture. The dikes have been removed, the levee breeched, and the canal blocked (Simms 2000).

Mattie Canyon was modified drastically as a result of the agricultural diversion in the 1970s. The canal diverted flood flows for the Cienega Creek watershed into Mattie Canyon, causing the canyon to adjust vertically and laterally to accommodate the added water and sediment load. Mattie Canyon had a gully plug that stopped a head cut of more than 20 vertical feet, thus protecting the rest of its watershed from the spread of this erosion. The gully plug was lost during a major flood in the fall of 2000.

Groundwater

The Cienega Creek aquifer consists of tight thin layers of sand alternating with lenses of silt and clay. This area of strata lies at depths to 350 feet. Most wells lie in this upper aquifer. Below 350 feet the layers of sand and silt/clay are subject to pressure from the aquifer below. This pressure causes the lower aquifer to "leak," providing an upward transfer of water (Nuzman 1970). Depth to bedrock ranges from less than 3 feet to more than 5,000 feet, and water reaches the surface when the depth to bedrock is less than 2,300 feet (Knight 1996).

Mountain front recharge and depth to bedrock ultimately control stream discharge in the Cienega Creek basin. An alluvial trough in the upper basin appears to divert ground water into the San Pedro basin (about 40% of the available subsurface flow). Part of the aquifer lies underneath the Babocomari River and Sonoita Creek basins (Knight 1996; Naeser and St. John 1996). Total ground water outflow from the upper basin (236.5 mi^2) has been estimated at 7,261 acre-feet (Knight 1996).

Recharge is considered to be almost entirely from mountain front sources and accounts for roughly 6-7% of annual precipitation. The thick soil in the larger valley does not permit much infiltration into the aquifer but stores water in the soil column, where it either evaporates or is transpired by vegetation. The main input of recharge to Cienega Creek is thought to be either Gardner Canyon in the Santa Rita Mountains to the west or the Whetstone Mountains to the east (Huth 1996; Naeser and St. John 1996). The recoverable ground water is estimated to be 5.1 million acre-feet over a 457 mi^2 area (upper and lower basins) (Naeser and St. John 1996).

Water for domestic and agricultural use is limited in the basin, and these uses rely on groundwater supplied by the Cienega Creek aquifer (Bota 1996). Both the towns of Sonoita (population 707 in 1995) and Elgin (population 223 in 1995) overlie the Cienega Creek aquifer. The upper end of the basin, however, appears to grade into the Babocomari drainage to the east. The groundwater supply for the Sonoita-Elgin area is estimated to be 1.2 million acre-feet (Naeser and St. John 1996). But consumption of more than the amount added to the aquifer annually through inflow and recharge–the amount known as safe yield–would eventually result in loss of surface flow in Cienega Creek and a loss of the riparian vegetation and other resources.

Naeser and St. John (1996) estimated the safe yield for the Sonoita area and the Upper Cienega Creek basin (excluding the Babocomari portion of the basin in which Elgin is located) to be 3,980 acre-feet per year–the amount of groundwater recharge. Since 2,663 acre-feet are already being used each year, only 1,317 acre-feet per year of use remain within safe yield. Therefore, the safe yield population density may be calculated at 2,767 people if each person consumes 151 gallons a day.

Sonoita is growing rapidly. Current zoning of one residence for every 4.13 acres would result in a population of about 8,200 when the area is fully built out. The resulting water consumption would be 8,092 acre-feet/year, well above the safe yield (Naeser and St. John 1996).

The upper Cienega Creek watershed has been estimated to provide 10% (6,200 acre-feet) of the recharge to the Tucson Active Management Area (AMA). In addition, the maintenance of this undeveloped watershed in good condition protects Tucson from floods that might surpass the city's flood control channel design. If the basin were fully developed, flood peaks could increase by an estimated 25-50% (Knight 1996).

Water Wells

The Arizona Department of Water Resources has 131 ground water wells registered for the Cienega Creek watershed in its Ground Water Site Inventory(GWSI) database. Sixty-one of the wells are in Pima County, 60 in Santa Cruz County, and 10 in Cochise County. The watershed on the Empire-Cienega, Empirita, and Rose Tree ranches has about 90 wells.

The planning area's water wells have been developed over many years for different uses. The main uses include domestic water for people living on ranches and water for livestock and wildlife, recreational uses, and fire fighting. Some of the existing wells were developed by the Gulf America Corporation (for expected future subdivision) and Anamax Copper (for use in future mining in the Santa Rita Mountains). Jack Greenway and Sam Bell developed a few irrigation wells on the Cienega Ranch for farming. (See list of water wells in Appendix 3.)

Surface Water

Springs and Reservoirs (Surface Water Impoundments)

Significant springs in the planning area include Cold Spring, Upper Empire Gulch Spring, Apache Spring, Post Canyon, Smitty Spring, Nogales Spring, and Little Nogales Spring. Perennial ponds include Clyne's Pond (Northwest Reservoir); Cienega Ranch Marsh; and five ponds in Cinco Canyon: # 1, #2, # 3, # 4, and # 7. Early settlers developed most springs when they filed their homestead claims. Some springs have been developed for livestock use. Most developed springs have not been maintained and are used seasonally by wildlife and livestock. (See list of springs and reservoirs in Appendix 3.)

Streams

Cienega Creek has perennial flow for 8.3 miles, and its tributaries Mattie Canyon and Empire Gulch have perennial flow for 1.1 and 0.9 miles respectively (Map 3-1). Although Cienega Creek and its tributaries have about 10.3 miles of surface water, during droughts the water flow becomes

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interrupted in places, resulting in dewatered stream segments or a series of unconnected pools. Cienega Creek had a loss of surface water from the canal diversion to Spring Water Canyon (0.75 miles) in the summer of 1997 and a loss of water from Apache Canyon to the Narrows (0.5 miles) in the summer of 1994. Normally, perennial stream segments that go dry during drought total about 1.25 miles or 10% of the stream length.

The University of Arizona measured instantaneous discharge on Cienega Creek from 1975 to 1983, and BLM made these measurements from 1988 to 1994. For 8 years of record the mean stream flow was 2.84 cubic feet/second (cfs) (2,050 acre-feet/year) as measured monthly at a station in the reach between Pump and Fresno canyons. Upstream from its confluence with Mattie Canyon, Cienega Creek's flow diminishes, mainly due to depth of bedrock. At the flow measurement station near the confluence of Oak Tree Canyon and Cienega Creek, base flows ranged from 0.3 to 0.9 cfs between 1988 and 1982. In 1994 BLM discontinued its instantaneous flow measurements at the two locations.

In 1995 a stream gaging station (water level recorder and galvanized housing) was installed at the site of an old masonry dam on Cienega Creek just above the confluence with Sanford Canyon. Continuous operation of this gage has been limited by maintenance problems and inundation by flood flows. The BLM is currently working with the U.S. Geological Survey (USGS) to rebuild this gage and put it in their "real time" gage network for Arizona.

Water Quality

The Arizona Department of Environmental Quality (ADEQ) is responsible for water quality in Arizona. ADEQ conducts biennial statewide surface water quality assessments, producing a report that lists streams that are not meeting state water quality standards for their designated uses. In the most recent report, ADEQ designated Cienega Creek and its tributaries in the upper Cienega Creek basin for the following uses: aquatic and wildlife (warm water fisheries), full body contact (swimming), and livestock use. ADEQ took relatively few samples but did sample three stations on Cienega Creek between 1991 and 1995. Those samples met state standards, showing that surface water in the upper Cienega Creek basin was fully supporting its designated uses.

Fecal coliform, fecal strep, ammonia, and sulfides have been detected in the upper basin and occasionally exceeded state water quality standards over the monitoring period of 1992 and 1993. The source of the fecal contamination was found to be animal (likely cows and other animals). All other water quality parameters have been within acceptable limits (BLM files). ADEQ sampled three stations on Cienega Creek between 1991 and 1995. All samples met water quality standards for the designated uses of warm water fisheries, full body contact, and livestock watering.

Groundwater is the source of all domestic water uses in the Sonoita area. It is pumped from the Upper Cienega Creek Basin and is of high quality. As of 1998, no water from any municipal or domestic wells was being treated. (ADEQ 1998).

Unique Waters

ADEQ has classified a segment of Cienega Creek below the planning area as a unique water–a water body determined to be one of Arizona's outstanding water resources for at least one of the following criteria: exceptional recreational or ecological significance, such as important geology, flora, fauna, water quality, aesthetic values, or wilderness characteristics. Cienega Creek's designation is based upon its importance as a natural groundwater recharge area, as a flood control area, and as habitat for the longfin dace, a native fish. These qualities, as well as values of endangered species habitat, also characterize the segment of Cienega Creek in the Empire-Cienega Planning Area. This segment was recently nominated as a unique water (ADEQ 1999).

Water Rights

After acquiring public lands in the Empire-Cienega Planning Area in 1988, BLM submitted new water right claims to the Arizona Department of Water Resources (ADWR) for adjudication. The planning area contains 246 water sources with 254 filings within the San Pedro River watershed and 319 sources with 357 filings in the Santa Cruz River watershed.

FIRE

Wildfire

The wildland fire situation in the Empire-Cienega Planning Area is critical from March through July because of the continuous stand of cured grass that easily ignites. Wildfires can quickly consume thousands of acres. The fire danger lessens in late July and August with the return of seasonal rainfall and high humidity. About 50% of all wildfires in this area are human caused.

The planning area's wildland-urban interface brings complexity to the wildland fire situation. Many primary residences and out structures occupy public and private land. Twelve structures are on public land, and hundreds of other residences and outbuildings are on intermixed and adjacent private lands. Any wildfire can quickly and seriously threaten these structures. The intensity of the wildland-urban interface fire situation is predicted to increase due to new construction in the area.

Fire History

Records from 1980 through 1988 show that 44 fires burned in the planning area (Arizona State Land Department), charring from 1 to 4,000 acres each. Thirty-six percent of all fires burned 100 acres or more before being controlled. Fifty percent of all wildland fires were human caused. Table 3-5 summarizes more recent fire history for the BLM Safford-Tucson Fire Zone encompassing areas administered by the BLM Safford and Tucson field offices. Using the 5-year average from 1993-1997, one can calculate that Arizona BLM responded to an average of 251 fires per year. These fires burned 31,197 acres in the Safford-Tucson Zone.

Table 3-5. Fire History - BLM Safford/Tucson Zone

	Human Caused		**Lightning Caused**		**Percentage of Fires**		**Percentage of Acres**	
Year	Average # Fires	Acres Burned	Average # Fires	Acres Burned	Human Caused	Lightning Caused	Human Caused	Lightning Caused
83-87	73	3,453	67	8,429	51	49	31	69
88-92	87	3,160	91	3,747	50	50	41	59
93-97	104	7,228	147	23,969	42	58	25	75

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The cause of the wildland fires varies from year to year. From 1993 to 1997, 42% of the fires (25% of the acres burned) were human caused. This percentage contrasts to that of the previous 5 years (1988-1992), during which 50% of the fires (41% of the acres burned) were human caused.

Wildland fires in the planning area most often burn on uplands in short grass with scattered mesquite and shrubs. These fires are usually of low intensity but move rapidly through the cured grass and associated vegetation. Grass heights vary from 1 to 3 feet on upland sites (short grass) with densities increasing from north to south. In short grass, flame lengths of up to 6 feet can spread at a rate of up to 5,148 feet per hour.

Fuels in riparian areas and bottomlands are dominated by tall grasses of up to 5 or 6 feet tall growing with mesquite, cottonwood, and other riparian trees. Fires in these fuels burn hotter than in the predominately short grass areas and exhibit moderate resistance to control. Fire in sacaton grass can display flame lengths of up to 12 feet and can spread at a rate of up to 6,864 feet per hour.

Fuels in the uplands and canyons consist mainly of shrubs with a short grass understory along with scattered juniper trees and other desert shrubs. This fuel type is common in the northern and eastern portions of the planning area. Fires can move rapidly through this fuel, depending on the density of the grass understory. Resistance to control is low to moderate. Fire flame lengths and rates of movement vary, depending on fuel moisture and weather conditions.

Prescribed Fire

The planning area's prescribed fire history is limited. Records from years before BLM's acquisition of the Empire-Cienega property show that prescribed burning was limited to small research burns conducted by the U.S. Department of Agriculture, Agricultural Research Service. These research burns have continued periodically since BLM's acquisition of the area. Small prescribed fires have also been conducted on the Appleton-Whittell ACEC (Research Ranch) over the past 2 years.

BIOLOGICAL RESOURCES/PROCESSES

UPLAND VEGETATION

Vegetation can be classified in a variety of ways for different purposes. For this planning effort, we are using ecological site descriptions developed by the Natural Resource Conservation Service (NRCS). These descriptions provide a system for describing existing vegetation and for comparing existing vegetation conditions to potential or desired future conditions.

Major Land Resource Areas

Arizona was divided into major land resource areas (MLRAs) in the 1960s (SCS 1981) (Map 3-2). MLRAs are broad geographic areas having similar topography, climate, soils, and vegetation. In the 1970s the MLRAs were further divided into sub-resource areas to obtain high-quality ecological site descriptions. Ecological (range) sites have been described for each MLRA.

In southeastern Arizona, the semidesert grasslands of the Southern Arizona Semidesert Grassland Resource Unit (41-3AZ) are perennial grass-shrub dominated rangelands which are positioned between the lower elevation shrublands of the Chihuahuan-Sonoran Desert Shrub (41-2AZ) and Upper Sonoran Desert Shrub (40-1AZ) resource areas and the higher elevation plains grassland and oak-grass savannah of the Mexican Oak-Pine

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Woodland and Oak Savannah resource area (41-1AZ) (Map 3-2).

The Empire-Cienega Planning Area encompasses about 170,000 acres within the Southeast Arizona Basin and Range Major Land Resource Area (MLRA-41) in the upper end of the 12- to 16-inch precipitation zone. The vegetation in the planning area grows predominately within the Southern Arizona Semidesert Grassland Resource Unit (41-3AZ, 12-16 inch precip. zone) while higher elevations of the planning area support vegetation in the Mexican Oak-Pine Woodland and Oak Savannah resource area (41-1AZ, 16-20 inch precip. zone) (Map 3-2).

The planning area is within one of North America's most diverse ecological areas, where the Sonoran, Chihuahuan, and Madrean life zones all come together. The current potential natural vegetation includes oak savannah, open grasslands, and desert shrub. Douglas-fir, Emory oak, and Mexican pinyon dominate the higher elevation woodlands. Cane beardgrass, sideoats grama, blue grama, threeawn species, and plains lovegrass dominate the grassland understories and open grasslands. Whitethorn, cholla, prickly pear, fourwing saltbush, ocotillo, and mesquite, with understories of perennial grasses, grow at the lower to mid elevations.

In the hilly country on both the west and east sides of Cienega Creek, northern exposures support plant communities characteristic of the 16-20 inch precipitation zone. Southern exposures support plant communities characteristic of the 12-16 inch precipitation zone. Table 3-6 summarizes the planning area's MLRAs and corresponding Brown and Lowe biotic communities (Brown 1982).

Ecological Sites

An ecological site is a unit of land occupying a specific environmental zone (MLRA) and capable of supporting a native plant community typified by an association of plant species that differs from other ecological sites in the kind or proportion of species. Within the MLRAs, the ecological sites are delineated by such criteria as topographic position, percent slope, soils and parent geologic material, precipitation, and elevation. Table 3-7 lists Sonoita Valley ecological sites within MLRA 41 - Southeastern Arizona Basin and Range.

Ecological site descriptions are based on the concept of ecological site potential. The historic climax plant community–what could grow in response to the physical characteristics–may differ greatly from the existing plant community, which has been influenced by environmental variation or management practices. The ecological site approach recognizes that different vegetation states can occur on similar sites because of different environmental forces or land management practices.

A vegetation state is the general description of the ecological site's characteristics. As the characteristics change, a site changes to a new state. The different plant communities produced by an ecological site are called vegetation states. The processes that cause a shift from one state to another are called transitional pathways.

Historic and Existing Upland Vegetation States

Before European settlement the upland ecological sites in the Empire-Cienega Planning Area were in a balance with a prevailing pattern of large,

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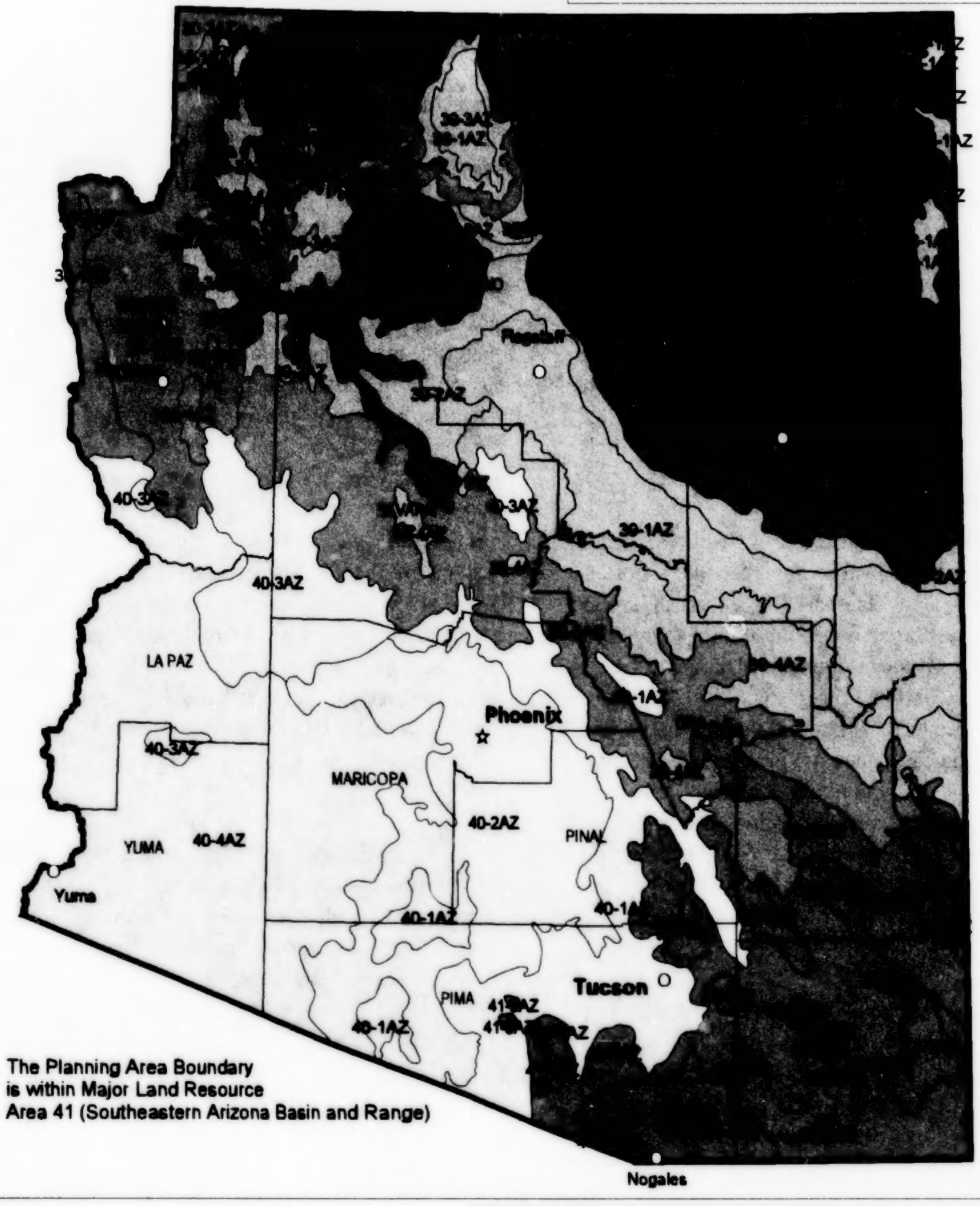
Map 3-2
Major Land Resource Areas (MLRAs) of Arizona



The Planning Area Boundary
is within Major Land Resource
Area 41 (Southeastern Arizona Basin and Range)

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LEGEND

- Planning Area Boundary
- Arizona Interior Chaparral
- Arizona and New Mexico Mountains
- Colorado and Green River Plateaus
- Mohave Basin and Range
- New Mexico and Arizona Plateaus and Mesas
- Sonoran Basin and Range
- Southeastern Arizona Basin and Range
- Southern Desertic Basins, Plains, and Mountains

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Table 3-6. Description of Major Land Resource Areas and Historic Climax Plant Communities in the Empire-Cienega Planning Area

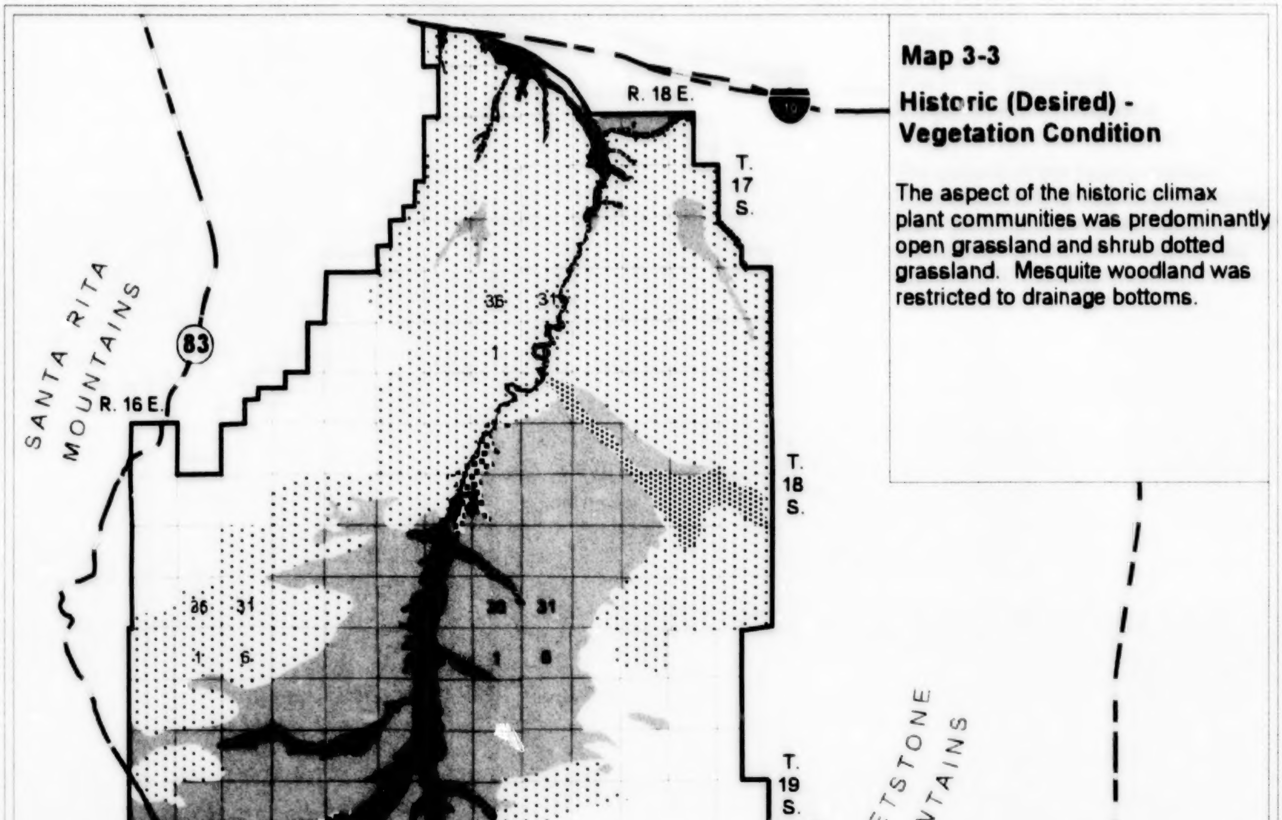
Major Land Resource Area	**Corresponding Brown-Lowe (Vegetation Communities)**	**Selected Characteristics of Major Land Resource Areas**			
		Elevation (in feet)	Landform Geology	Potential Climate	Historic Climax Plant Community
41-1AZ Oak-Pine Woodland and Oak Savannah	Madrean-Evergreen Woodland	5,500 to 8,500	Steep, rocky hills and mountains	Ppt 16-35" 60% during summer	Mexican blue, Arizona white, Emory and silverleaf oaks; Arizona rosewood; mountain mahogany; Mexican pinyon, Apache and Chihuahuan pine; manzanita; turbinella oak; silktassel; skunkbush; sideoats, hairy, and spruce top gramas; deergrass; Texas little and cane bluestem; plains lovegrass.
	Plains Grassland		Gently to strongly sloping fans, and level valley floors		Sideoats, hairy, and spruce top gramas; Crinkle-awn, bullgrass, wolftail, Texas timothy, little and cane bluestem; plains lovegrass.
41-3AZ Southern Arizona Semidesert Grassland	Semidesert-Grassland	3,500 to 5,500	Gently to strongly sloping fans, and level valley floors	Ppt 12-16" 60% during June through Sept.	Sideoats, black, hairy, blue, slender and spruce top gramas; bush muhly; Arizona cottontop; cane bluestem; alkali and big sacaton; vine mesquite; plains lovegrass; squirreltail; tobosa; fourwing saltbush; soaptree yucca; range ratany; false mesquite; shrubby buckwheat.

fast-burning wildfires consuming huge amounts of the perennial grass in late spring and early summer before the summer monsoons. These wildfires controlled invasive brush and trees. They helped recycle nutrients. And they resulted in the rapid regrowth of fresh perennial grasses. The visual aspect of the rangeland was an open grassland dominated by perennial grasses such as plains lovegrass, cane beardgrass, sideoats grama, black grama, blue grama, bush muhly, sacaton, vine mesquite, and several threeawn species intermixed with leaf succulents, including yuccas, agaves, and beargrass.

But mesquite, burroweed, whitethorn, snakeweed, and Lehmann's lovegrass have invaded much of the planning area to various degrees. Continuous livestock grazing, climatic changes, and suppression of wildfire over the past century have reduced desirable perennial grasses and changed much of the area from the native mid-grass historic climax plant community state to a native grass-mesquite-half shrub state or a mixed native/Lehmann's lovegrass-mesquite-half shrub vegetation state. The historic vegetation states are shown in Map 3-3. Existing vegetation states are shown in Map 3-4.

Ecological Processes in Grasslands

Upland vegetation communities change over time due to environmental influences. The vegetation communities continuously move among a series



Map 3-3

Historic (Desired) - Vegetation Condition

The aspect of the historic climax plant communities was predominantly open grassland and shrub dotted grassland. Mesquite woodland was restricted to drainage bottoms.

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LEGEND
- — Planning Area Boundary
- ▒ Grassland
- ▨ Grassland-Mesquite
- ═ Shrub-Grassland
- ⁘ Mesquite
- ■ Riparian
- ░ Shrub Land
- ■ Sacaton
- ⁚ Shrub Dotted Grassland
- ▩ Xero-Riparian Area

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Table 3-7. Sonoita Valley Ecosites within Major Land Resource Area (MLRA) 41 - Southeastern Arizona Basin and Range

Ecological Site Descriptions	
41-3AZ-Southern Arizona Semidesert Grassland	41-1AZ-Mexican Oak-Pine Woodland and Oak Savannah
Basalt Hills, 12-16"pz	Limestone Hills, 16-20"pz
Clayey Hills, 12-16"pz	Limy Slopes, 16-20"pz
Limestone Hills, 12-16"pz	Limy Upland, 16-20"pz
Limy Slopes, 12-16"pz	Loamy Bottom, 16-20pz
Limy Upland, 12-16"pz	Loamy Bottom, subirrigated, 16-20"pz
Loamy Bottom,(PRJU), 12-16"pz	Loamy Hills, 16-20"pz
Loamy Bottom, Subirrigated, 12-16"pz	Loamy Upland, 16-20"pz
Loamy Bottom, Swales, 12-16"pz	Sandy Bottom (QUEM, QUAR), 16-20"pz
Loamy Hills, 12-16"pz	Sandy Bottom, subirrigated, (PLWR, JUMA, FRVE2), 16-20"pz
Loamy Upland, 12-16"pz	Sandyloam Upland, 16-20"pz
Sandy Bottom, 12-16"pz	Volcanic Hills, 16-20"pz
Sandy Bottom, Subirrigated, (POFR, SAGO), 12-16"pz	Loamy Bottom, Swales, 16-20"pz
Sandy Loam Upland, 12-16"pz	Loamy Upland, Limy, 16-20"pz
Sandy Loam Deep, 12-16"pz	Shallow Upland, 16-20"pz
Shallow Upland, 12-16"pz	
Volcanic Hills, 12-16"pz	

of ecological states in response to disturbance factors such as climate, grazing, fire, and disease.

The present vegetation communities in the planning area are an expression of the past disturbance regimes and land use practices.

In the planning area's semidesert grasslands before European settlement, fire was probably the single most common disturbance controlling the transition from open grassland states to shrub- and tree-invaded states on the upland ecological sites. Periodic wildfires reduced shrub cover and allowed grasses to remain dominant.

Livestock grazing played a major role in defining the present ecological states of the grasslands. Year-long grazing gave cattle the greatest opportunity to selectively graze preferred plants. This grazing resulted in undue intensity and frequency of defoliation of these species, placing them at a disadvantage in plant competition. The frequency of fire in these grasslands was later reduced by removal of these perennial grasses as fuels and by human fire suppression. Under heavy grazing and with low fire occurrence, shrubs will generally remain until removed by fire or some other disturbance. Mesquite, burroweed, whitethorn, and other shrubs have increased in response to the loss of perennial grasses in some areas.

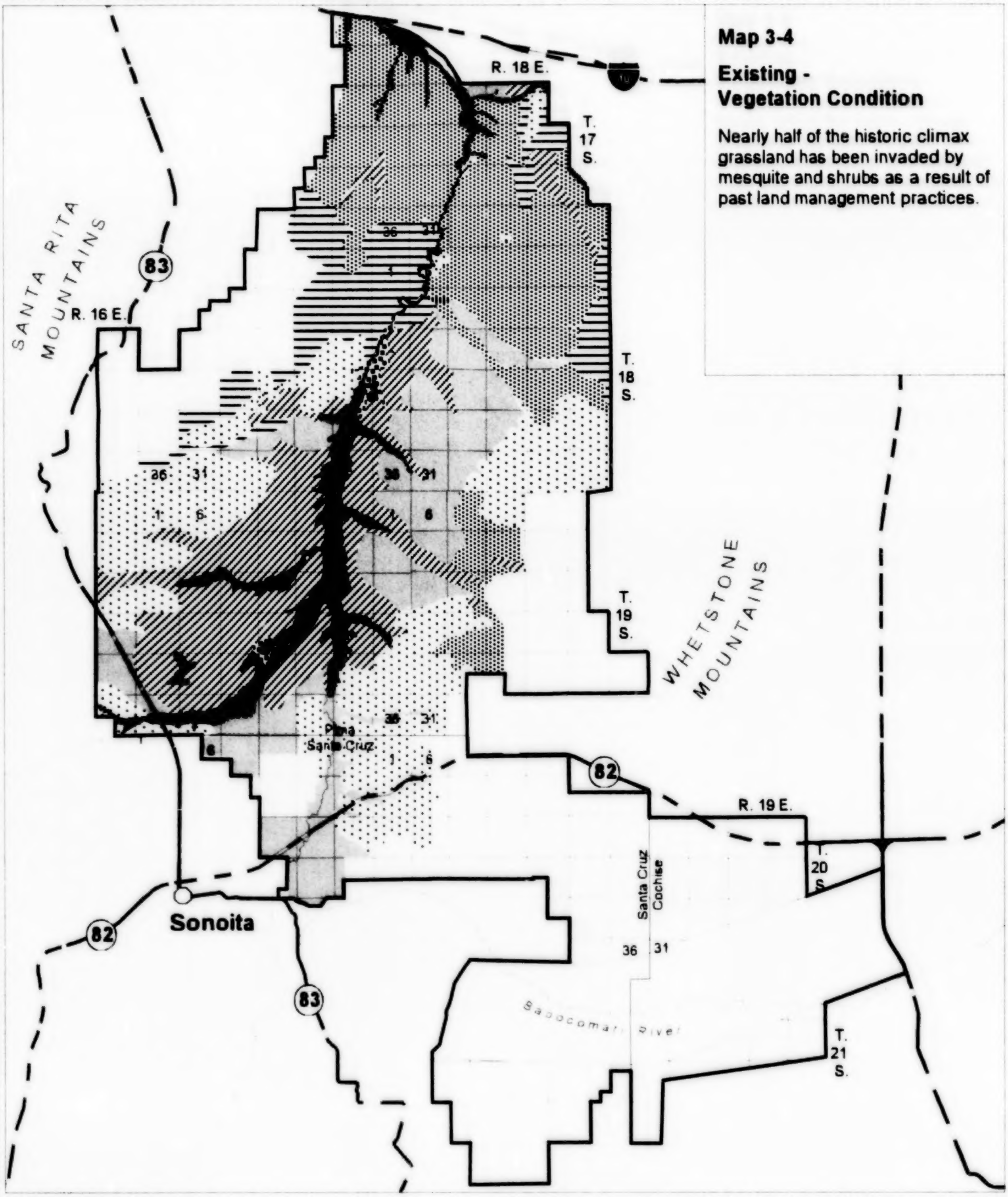
Ecological Site Inventories

Ecological site inventories delineate and measure existing plant communities and compare these communities to potential plant communities that could grow on the same site as a result of changes in management actions.

Map 3-4

Existing - Vegetation Condition

Nearly half of the historic climax grassland has been invaded by mesquite and shrubs as a result of past land management practices.



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LEGEND
- — Planning Area Boundary
- ░ Grassland
- ▨ Grassland-Mesquite
- ☰ Shrub-Grassland
- ⁘ Mesquite
- ■ Riparian
- ▒ Shrub Land
- ■ Sacaton
- ⁚ Shrub Dotted Grassland
- ▩ Xero-Riparian Area

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Ecological site delineations are landscape divisions used to provide order to a complex system of vegetation in regions. The major significance of the concept includes its ecological relevance. Soils data play the major role in extending existing data to similar environmental conditions. Often, changes in soils will define a unique vegetation community and ecological site. But similar vegetation communities may grow on different soils, and therefore the ecological sites may be a unique soil series or an association of different soils with properties that produce similar vegetation. Ecological site delineations require more than a soils map. Vegetation analysis in the field is a must (Ruyle-Range Site Concept: URL: http://ag.arizona.edu/OALS/agnic/siteguides/concept.html).

For each ecological site the Natural Resources Conservation Service (NRCS) develops and maintains ecological site descriptions, which include descriptions of the historic climax plant community (NRCS Grazing Lands Technology Institute 1997, *National Range and Pasture Handbook*). The historic climax plant community is based upon the ecological potential and capability of each site. The ecological site descriptions are used in the ecological site inventory to determine present vegetation condition by comparing the present vegetation to vegetation states that can exist on the site, including the historic climax plant community. The comparison can be made through a similarity index. The index is expressed as the percentage of the desired plant community that is present on the site. In assessing a site's condition or degree of function, the evaluation compares each site to its own potential.

A comparison of the present plant community to the historic climax plant community on a particular ecological site provides (1) a basis for describing the extent and direction of changes that have taken place and (2) a way of predicting changes that can take place in the plant community as a result of a specific treatment or management action. The similarity index of a site to the historic climax community therefore measures change.

This index shows how climate and management have affected a site's plant community. This information gives us a starting point for setting objectives and monitoring progress in achieving them. The goal is often to change the present plant community toward a plant community that better protects the health of the basic rangeland resource. Or the resource objective may be to achieve a certain habitat type or mosaic for wildlife management or endangered species recovery. (NRCS Grazing Lands Technology Institute 1997).

BLM has completed ecological site inventories on most of the planning area. The ecological site inventory for the Empire-Cienega allotment was completed in the fall of 1995, and the ecological site inventory for the Empirita allotment was completed in 1994 (Map 3-5). Ecological site inventories have not been completed for the Rose Tree and Vera Earl allotments or for lands within the Empire Mountains. An ecological site inventory is in progress for the Appleton-Whittell ACEC (Research Ranch). Table 3-8 summarizes the ecological sites within the Empire-Cienega and Empirita portions of the planning area. More

Table 3-8. Ecological Sites Within the Empire-Cienega and Empirita Ranch Areas

Ecological Site	Similarity Index to Historic Climax (range)	Visual Aspect- Historic Climax Plant Community	Acres	% of Total
Basalt Hills	71	shrub-grass mixed	601	0.6
Deep Sandy Loam/Sandy Bottom		grassland	1,494	1.5
Limestone Hills and Limestone Hills/ Limey Upland/Volcanic Hills	60-67	shrubland mixed with grassland	5,847	5.8
Limy Slopes and Limy Slopes/Limy Upland and Limy Slopes/Loamy Upland	54-60	shrubland mixed with grassland	37,533	37.3
Loamy Bottom/Subirrigated	66	sacaton	3,744	3.7
Loamy Bottom/Mesquite	N/A	mesquite bosque	581	0.6
Loamy Hills and Loamy Hills/Limy Slopes	59-92	oak woodland with grassland	16,108	16.0
Loamy Upland		grassland (savannah)	115	0.1
Loamy Upland/Swales	42-77	grassland	6,577	6.5
Sandy Bottom/Swales	65	xeroriparian with grassland	1,528	1.5
Sandy Bottom/subirrigated	N/A	deciduous riparian woodland	614	0.6
Sandy Loam Upland/Loamy Upland	31-54	grassland (savannah)	11,523	11.5
Volcanic Hills and Volcanic Hills/Limy Slopes and Volcanic Hills/Shallow Upland/Clay Hills	66-85	oak woodland intermixed with grasses and shrubs	14,350	14.3
TOTAL			**100,616**	**100**

detailed descriptions of the ecological sites and more information on the ecological site inventories and monitoring locations are included in Appendix 3, Ecological Site Inventories. Plant communities on these ecological sites are strongly influenced by the soil's ability to capture water from intense summer thunderstorms. Sites with sand to sandy loam surface textures are more productive in this resource area because of their ability to capture most of the summer rain. These sites produce extremely diverse and productive grasslands. Ecological sites with heavier textured surfaces allow most of the summer moisture to run off. The slow, gentle winter rains provide most of the soil moisture on these sites, which tend to support more deep rooted shrubs.

RIPARIAN AND WETLAND AREAS

About 18.5 miles of riparian habitat occur along Cienega Creek and its tributaries–Mattie Canyon, Empire Gulch, Gardner Canyon, Mud Springs, and North Canyon–on BLM-administered public land (Map 3-6). An additional 2.2 miles are present on intermixed State Trust Lands. The cienega or marsh vegetation that gives Cienega Creek its name occurs within most of its perennial reaches. The stream banks are dominated by deer grass with varying densities of cottonwood/willow

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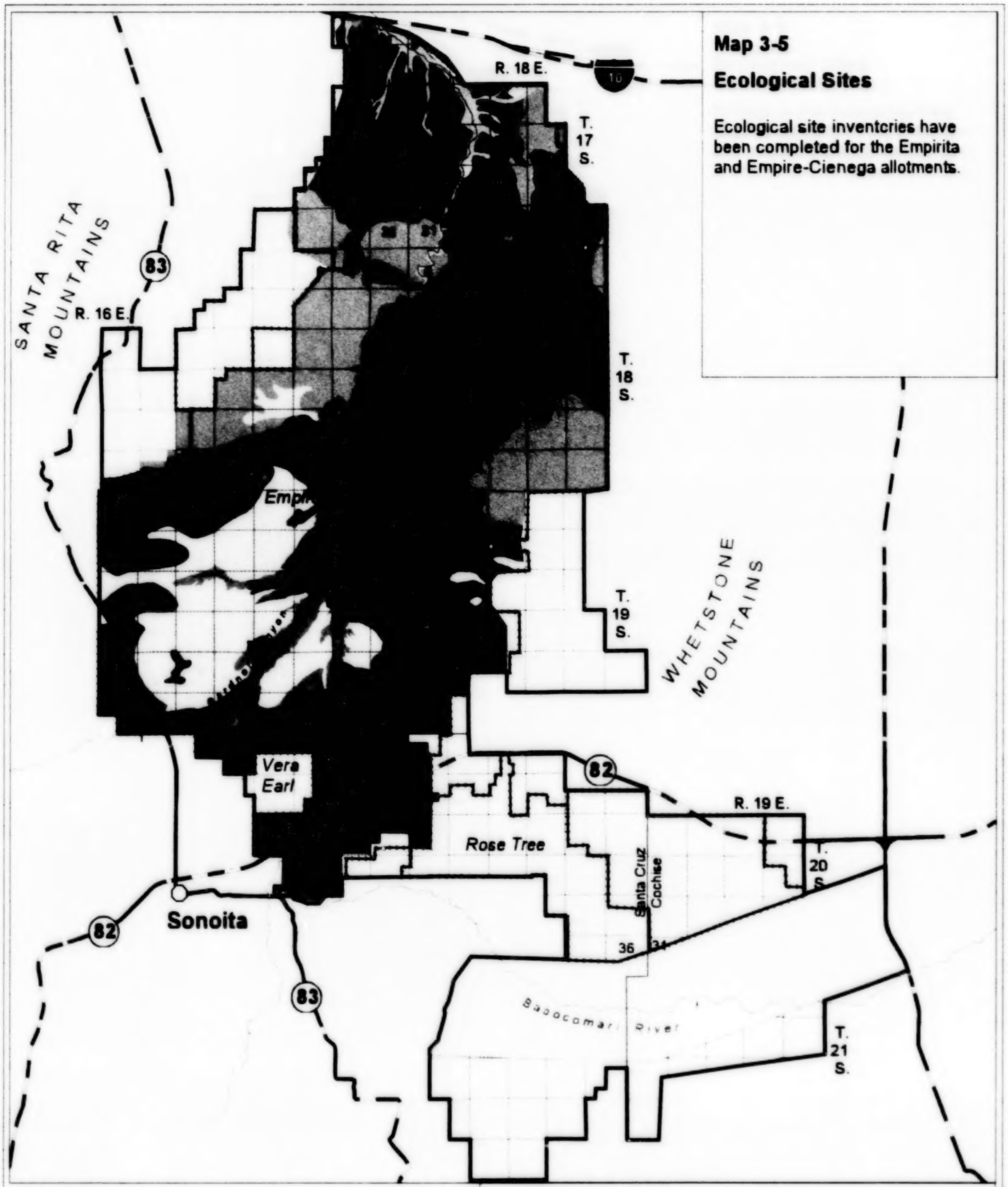

Map 3-5

Ecological Sites

Ecological site inventories have been completed for the Empirita and Empire-Cienega allotments.

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LEGEND

- Planning Area Boundary
- Grazing Allotment Boundary

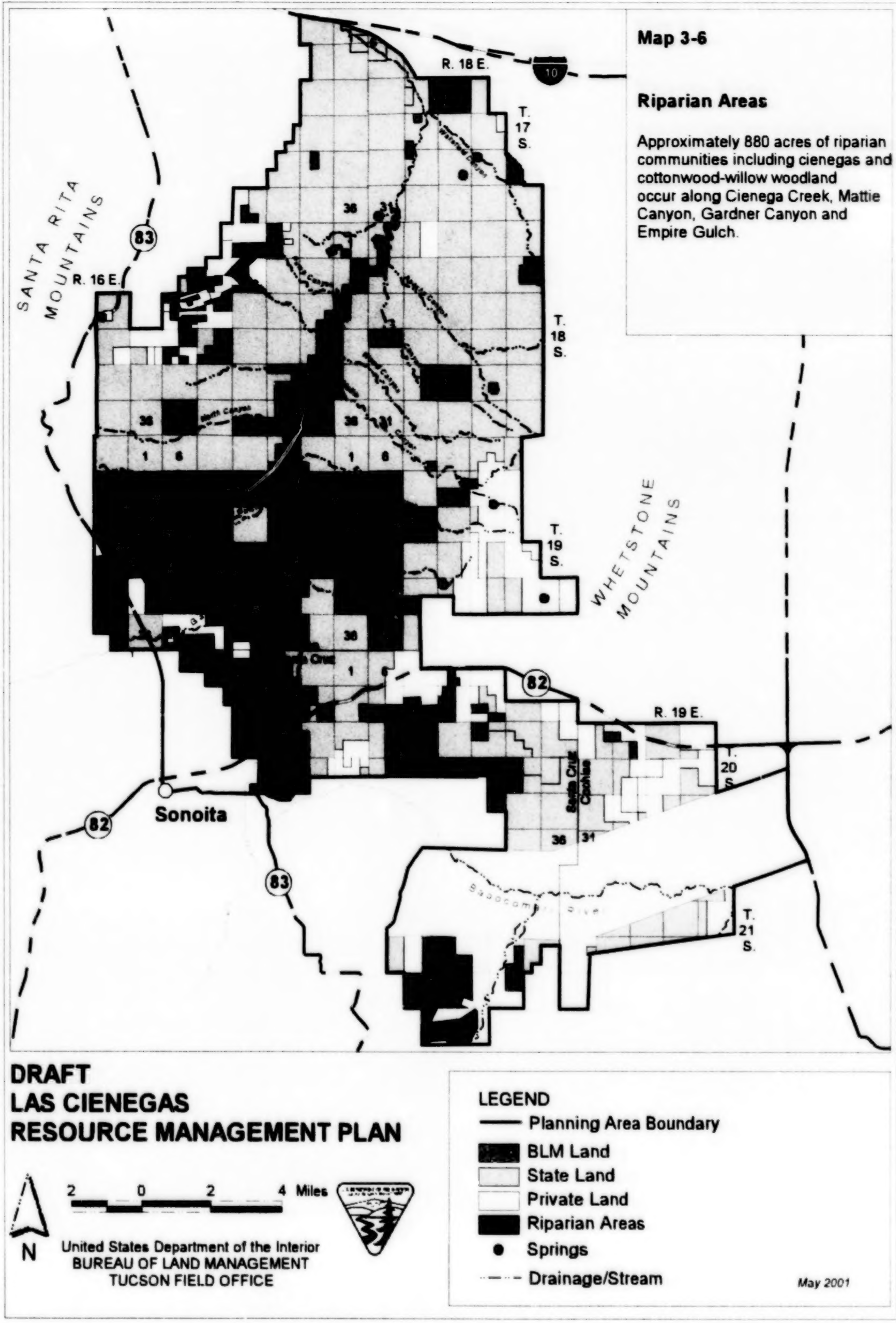
■ Basalt Hills
□ Deep Sandy Loamy, Sandy Bottom
■ Limestone Hills, Limestone Hills/Limey Uplands/Volcanic Hills
■ Limey Slopes, Limey Slopes/Limey Upland, Limey Slopes/Loamy Upland
▨ Loamy Bottom Subirrigated
■ Loamy Bottom Mesquite Bosque
■ Loamy Hills, Loamy Hills/Limey Slopes
▨ Loamy Upland Swales
■ Sandy Bottom Swales
■ Sandy Bottom Subirrigated
□ Sandy Loam Upland/Loamy Upland
▨ Volcanic Hills, Volcanic Hills/Limey Slopes, Volcanic Hills/Shallow Upland/Clay Hills

May 2001

Map 3-6

Riparian Areas

Approximately 880 acres of riparian communities including cienegas and cottonwood-willow woodland occur along Cienega Creek, Mattie Canyon, Gardner Canyon and Empire Gulch.



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riparian woodland. Extensive sacaton grasslands occupy the stream terraces along Cienega Creek south of its confluence with Mattie Canyon. North of the Mattie Canyon confluence, mesquite bosques grow next to the cottonwood-willow dominated riparian woodlands. Several natural perennial ponds with cienega vegetation are also found in the sacaton grasslands on the Cienega Creek floodplain.

Sonoran Riparian Deciduous Woodland

The planning area's riparian woodlands occur on the Sandy Bottom-Subirrigated ecological site on the low stream terrace and stream banks of the wet reaches of Cienega Creek, Empire Gulch, and lower Mattie Canyon. This site benefits from high water tables and the extra moisture from flooding. Soils are deep and sandy. Slopes are nearly level. The potential plant community is a southwestern deciduous riparian woodland dominated by Fremont cottonwood (*Populus Fremontii)* and Goodding willow (*Salix gooddingii*). Tree canopy can be as high as 70% on this site. Other trees found in minor amounts include velvet ash (*Fraxinus pensylvanica)*, Arizona walnut (*Juglans major)* and netleaf hackberry (*Celtis reticulata*). Seep willow (*Baccharis glutinosa*) is a common shrub in the understory.

Southern Arizona Warm-temperate Riverine Marshes (Cienegas)

This is the cienega or marsh community for which Cienega Creek is named but for which an ecological site description has not been developed. Cienegas occur within wide, gently sloping valleys where flood velocities are readily dissipated, at sites where ground water intersects the surface to form areas of deep to shallow perennial water bordered by drier margins with intermittently saturated soils.

Cienega vegetation often grows in zones or bands that reflect these gradients of water availability. Areas with saturated soil or shallow water are vegetated mainly by grasses (Gramineae) and by low-statured emergents including rushes (*Juncus* spp), sedges (*Carex* spp), flat sedges (*Cyperus* spp) and spike rushes (*Eleocharis* spp). Deeper pools support submergent aquatic vegetation such as penny wort (*Hydrocotyle* spp) and stonewort (*Chara* spp).

Cienega soils consist of layers of organic peats and fine-textured silts. These soils can build to depths of several meters, as the productive cienega vegetation annually grows and decomposes and as silts are trapped during flood flows. The sponge-like organic soils store water and increase base flows during droughts. And the cienega's densely vegetated surface moderates peak flows during wet periods (BLM files; Fernald 1987; Hendrickson and Minckley 1984)

Along Cienega Creek representative aquatic and semiaquatic vegetation includes deer grass (*Muhlenbergia rigens)*, cattail (*Typha latifolia, Typha domingensis*), bulrushes (*Scirpus*), rushes (*Eleocharis, Juncus, Carex*), sedges (*Cyperus*), yerba mansa (*Anemopsis californica*), Goodding willow, water parsnip (*Berula erecta*), stonewort (*Chara*), horned pond-weed (*Zannachellia palustris*), penny-wort (*hydrocotyle verticillata)*, and speedwell (*Veronica)*. Cienega Creek is bordered by the Riparian Woodland community as described above.

Aquatic and Riparian Processes

Riparian areas and associated stream channels constantly undergo change. The riparian area and associated aquatic habitat are exposed to natural external factors, mainly stream flow and sediment transport (Rosgen 1996; Swanston 1991).

Properly functioning riparian areas change gradually and have adequate vegetation, floodplain development, or woody debris to dissipate flood energies (BLM 1993). Water from floods is slowed and spread out on floodplains where it can seep into the soil and drop sediment, which builds banks and floodplains.

Canyon-Bound Streams

Riparian vegetation, mainly in the form of cottonwoods, willows, and deer grass, holds soil against erosion and improves fish habitat by holding banks and allowing a diversity of fish habitat types to form through sediment scour and deposition. In this way riparian plants influence the formation of pools, cover, riffles, runs, bars, braids, and clean spawning habitat. But large floods may scour riparian vegetation and stream banks, where the floodplain has been reduced by narrow canyon features or channelization or where bank vegetation has been reduced.

Rainfall and watershed conditions influence flooding. Watersheds dominated by bare ground or with reduced ground cover foster flash flooding. Flash flooding in turn can destabilize channel features as the stream adjusts to the new flood and sediment regime (Rosgen 1996). Excess sediment from these unstable watersheds can fill with fine sediment important fish habitat features such as pools and riffles. And tributaries adjusting to a new base level in a down-cut mainstem stream can inflict other damage.

Riparian vegetation goes through stages of development as young trees grow older and sediment deposition builds banks and terraces that alter the soil-water relationships that influence plant species composition, density, and abundance. Early stages (early seral) have fewer species and younger age classes of trees. Later stages (late seral) have more species and more older trees. If a riparian area can function unimpaired by disruptive land practices, it may attain its potential (BLM Proper Functioning Condition Work Group 1993, Figure 3).

Flooding serves to disturb the riparian community and allow new seed beds to develop for tree seedlings and openings for herbaceous plants. The result is a mosaic of plant species, age classes, and microclimates, a mosaic that supports a diversity of habitat conditions and animals.

The impairment of vegetation development that reduces vegetation density, plant vigor, or production directly alters the integrity of floodplains and stream banks. This impairment leaves the degraded riparian area vulnerable to further damage by flooding as the riparian community has lost its ability to dissipate flood energy and resist erosion (BLM Proper Functioning Condition Work Group 1993; BLM 1990, Figure 2, Channel Evolution).

Cienegas

Unlike most riparian areas dominated by trees, herbaceous marsh vegetation holds soil against erosion. This action improves fish habitat by holding soil and banks that allow for a diversity of fish habitat types to form through sediment scour and deposition (Rosgen 1996; Hendrickson and Minckley 1984; Leopold 1997; Medina and others 1995). In this way wetland plants influence the formation of pools, runs, and riffles. Wetland plants also contribute to habitat quality by providing undercut banks, overhanging cover, shade, and escape cover in spaces between plant stems.

Beaver are thought to have played an important role in forming and perpetuating cienegas. Their dams prevent erosion, collect and retain organic matter and sediment, and raise water tables. Beaver are known to have been present along "Cienegas de Los Pimas," which stretched from the town of Tucson to Pantano before statehood (Hendrickson and Minckley 1984).

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Channel scouring and sediment deposition on the floodplain continually change soil conditions and stream channel features. These changes influence plant community dynamics and channel features (pools, runs, riffles).

The composition and structure of the riparian community can likewise influence sediment deposition and soil stability, creating a dynamic feedback response between the plant community and physical processes (Hendrickson and Minckley 1984; Medina and others 1995). For example, rushes, bunch grasses, carpets of sedges, and stands of willows trap sediment during floods. These plants also bind soils with roots (Cornwall 1998). Herbaceous plants with deep fibrous roots and the highest stem density and above-ground biomass in cienega wetlands provide the most soil stability and are not disturbed even by large floods (Cornwall 1998; Hendrickson and Minckley 1984). Instead, floods act on "nick points" where vegetation has been disturbed and turbulence exists during floods. As bed material is scoured, it is redepositied in run or riffle areas at the toe of the pool and adjacent floodplain.

Riffles and runs contain armored sediments that are further stabilized by vegetation, especially plant roots, which cover the floodplain and cross runs and riffles (Medina and others 1995). Nick points that turn into pools eventually stabilize when they reach bed materials or vegetation thick enough to prevent further erosion. As a result of these processes, Cienega Creek contains "slit pools" over 6 feet deep as well as runs and riffles that average less than 6 inches deep. These pools, runs, and riffles are often surrounded by saturated soil or thin sheets of standing water with thick mats of marshland vegetation and Goodding willows.

Flooding and sediment input are influenced by rainfall and watershed characteristics and condition/health (NRCS 1994; Brooks and others 1991). Watersheds dominated by bare ground or with reduced ground cover foster larger flood peaks, which can destabilize cienegas (Leopold 1994; Brooks and others 1991; Hendrickson and Minckley 1984). Excess sediment from these unstable watersheds can fill with sediment important fish habitat features such as pools and riffles (Rosgen 1996; Leopold 1994, 1997; Meehan 1991). Over geologic time, rare heavy floods may scour marsh vegetation and stream banks, which are recolonized by plants and eventually evolve back into cienegas.

Aquatic Habitat

Aquatic habitats are controlled mainly by sediment input and transport, which are functions of the volume and pattern of precipitation and runoff. Watershed and riparian health influence sediment transport and runoff characteristics, which affect flood magnitude. Along the stream channel, high-gradient, narrow channels receive coarser substrate, while finer sediments are deposited where floodplains are wider and gradients lower. Pools tend to be permanent only where protected from excess sediment from ephemeral tributaries. When sediment input is excessive, pools may become rare due to sediment filling. In constrained canyon-bound reaches of streams, non-native fish cannot resist flooding. Unlike native fishes that have adapted to flooding in constrained canyon reaches, these exotic fishes tend to be eliminated or severely reduced by floods (Minckley and Meffe 1987).

In contrast, Cienega Creek is a valley bottom stream with a wide floodplain that is ideal for establishing and spreading non-native fishes to the exclusion of Gila chub and Gila topminnow. In this type of system, non-native fishes, once established, constitute a biotic habitat element that is incompatible with and can eliminate native fishes (Minckley and Deacon 1991)

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Riparian and Wetland Area Condition and Inventory

BLM inventoried riparian areas along Cienega Creek and its tributaries on public lands from December 1988 through July 1989 (Table 3-9). The riparian inventory techniques are outlined in the BLM Phoenix District's Riparian Area Condition Evaluation (RACE) Handbook (BLM 1987d). As a result of the 1988-89 inventory, 11.1 miles (60%) of riparian habitat received ratings of 5-11 for an overall unsatisfactory rating, and 7.5 miles (40%) of riparian habitat received total ratings of 12-16 for an overall satisfactory rating.

The woody species regeneration rating was the major contributor to overall unsatisfactory ratings in 1988-89. Nipping of the apical meristem on seedling trees often stunts growth or kills seedlings and can prevent the establishing of young trees as replacements in the riparian system. Thus, where cattle and deer had nipped the tops of more than 80% of the young trees, the segment received the lowest rating for woody species regeneration. This heavy browsing occurred on 11.3 miles of riparian area, of which 8.4 miles (or 74%) received overall ratings of unsatisfactory. An additional 2.9 miles of riparian area received woody species regeneration ratings of 1 and overall unsatisfactory ratings due to poor conditions for establishing seedling trees, such as lack of surface water.

BLM found the following other problems in riparian areas in 1988-89:

- Off-road vehicle travel in the creek bed.
- Bank alteration by vehicles, livestock, and old irrigation projects.
- Loss of vegetation cover from livestock use.
- Head cuts, which may have been caused by runoff from roads or past overgrazing.

Most of these problems have been corrected since 1990. Livestock access to riparian areas has been controlled by installing riparian fencing along most of Cienega Creek. BLM has closed several road crossings and rerouted traffic across hard-surfaced crossings. As a result, riparian conditions have improved markedly. Although the soils along Cienega Creek are highly erodible, increases in deer grass, willow, cottonwood, rushes, horsetail, and other plants have stabilized the banks to the point that even large floods do not affect most bank surfaces. Increases in riparian vegetation density have increased overstory and mid-story cover and vegetation cover on banks.

In 1993 and again in 2000, BLM re-assessed the riparian areas along Cienega Creek using the riparian evaluation portion of the RACE inventory. The results showed continued improvement along much of the creek. Of the 11.9 miles of riparian habitat evaluated in 1993, 8.5 miles (71%) were in satisfactory condition, and 3.4 miles (29%) were in unsatisfactory condition. Of the 12.5 miles assessed in 2000, 100% were in satisfactory condition (Table 3-9; Appendix 3, Riparian Area Conditions and Management). Riparian proper functioning condition assessments completed in 1993 and in 2000 showed similar trends with the percentage of the creek in proper functioning condition increasing from 2% to 61% (Table 3-10, Appendix 3, Riparian Area Conditions and Management).

Aquatic Habitat Condition and Inventory

In 1989-90 BLM classified all aquatic habitats along the perennial length of Cienega Creek and

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Table 3-9. Riparian Area Condition Evaluation (RACE) Summaries for Empire-Cienega Riparian Areas

		1989-1990		1993		2000	
Stream	**Length**	% length satisfactory	% length unsatisfactory	% length satisfactory	% length unsatisfactory	% length satisfactory	% length unsatisfactory
Cienega Creek	12.5	43[1]	57	71[2]	29	92[3]	8
Empire Gulch	3.3	40	60	-	-	-	-
Gardner Canyon	1.3	0	100	-	-	-	-
Mattie Canyon	1.2	100	0	-	-	-	-
North Canyon	0.6	0	100	-	-	-	-
Cienega Canal	0.9	0	100	-	-	-	-
Mud Springs	0.3	100	0	-	-	-	-
TOTAL	**20.1**	**40[1]**	**60**	**71**	**29**	**92**	**8**

[1] Calculations exclude 1.5 miles of riparian area on Cienega Creek which were not sampled in 1989/90.

[2] Calculations exclude 0.6 miles of riparian area on Cienega Creek which were not sampled in 1993.

[3] Calculations exclude 0.6 miles which are no longer managed as riparian in 2000 due to lack of site potential.

inventoried them for characteristics related to fish habitat. BLM inventoried habitat type and 12 parameters of habitat complexity, including depth, vegetation cover in the water, cover overhanging the water's surface, and undercut banks. In 2000 BLM re-assessed aquatic habitats along four segments of Cienega Creek to determine change over the 10-year period (Tables 3-11, 3-12, and 3-13). The selected segments varied from 0.28 to 0.52 miles in length. They were monitored for the same fish habitat characteristics as in 1989-90.

In 1989-90 livestock still grazed much of the area along Cienega Creek, but grazing did not uniformly affect the creek. Cattle predominately used downstream segments lightly in the winter, and impacts were limited. Impacts were heavier in warm-season pastures along the southern half of the creek. Many segments lacked overstory vegetation, overhanging vegetation, or undercut banks. Floating vegetation (filamentous algae mats) was a common cover type due to increased nutrient levels and fewer shaded habitats. In many segments, shallower and wider habitats such as glides and riffles predominated over deeper pool habitats.

Table 3-10. Riparian Proper Functioning Condition Assessment (PFC) Summaries for Empire-Cienega Riparian Areas

	1993[1]					2000[2]			
Stream	Length (miles)	% PFC	% Functional at Risk	% Non-functional	% unknown	Length[3] (miles)	% PFC	% Functional at Risk	% Non-functional
Cienega Creek	12.5	4	78	18	0	11.9	67	33	0
Empire Gulch	3.3	0	100	0	0	3.3	39	61	0
Gardner Canyon	1.3	0	0	100	0	1.3			
Mattie Canyon	1.2	0	100	0	0	1.2			
North Canyon	0.6	0	0	100	0	0	0	0	0
Cienega Canal	0.9	0	100	0	0	0.9	0	100	0
Mud Springs	0.3	0	0	0	0.3	0.3			
TOTAL	**20.1**	**2**	**75**	**21**	**2**	**18.9**	**61**	**39**	**0**

[1] Based on 1993 riparian inventory data for Cienega Creek and 1989/90 riparian inventory data for other streams.

[2] From riparian proper functioning condition assessments completed in 2000.

[3] A total of 0.6 miles of Cienega Creek and 0.6 miles of North Canyon are no longer managed as riparian areas in 2000 due to lack of site potential.

In limited reaches of Cienega Creek, pool habitats were well developed. These habitats were generally surrounded by marsh and had a high degree of cover. Such cover included emergent vegetation, submerged vegetation, exposed roots from deer grass and trees, undercut banks, and medium and small woody debris. Proportions of habitat types changed drastically for all four segments between 1990 and 2000. Rather than lumping all four segments together for comparison, this discussion covers each segment separately because each has different characteristics that influence aquatic habitat development.

The Headwaters segment showed a decrease in the area of pools, yet the number and depth of pools increased (Tables 3-11 and 3-12). Run, riffle, and glide all decreased while marsh increased. This segment is the only one that is changing from a pool habitat to a marsh habitat. The number of pools has increased as has their depth, showing that not all pool habitats are in jeopardy of total replacement by marsh.

But the data show that shallow habitats (run, riffle, glide) are on the verge of total replacement by the encroachment of dense herbaceous aquatic vegetation. This segment showed a 10-fold increase in vegetation cover and 10-fold increase in overhanging cover (Table 3-13). Undercut banks dramatically increased in that none were detected in 1990.

The processes in the Headwaters segment are driven mainly by the small watershed size

Table 3-11. Change in Aquatic Habitat Surface Area by Segment for Cienega Creek, 1990 and 2000

	Pool (%)		**Run (%)**		**Riffle (%)**		**Glide (%)**		**Marsh (%)**	
Segment	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000
Headwaters (above Gardner Canyon (59M)	64.1	35.5	4.2	0.5	15.0	0.0	4.6	0.2	12.1	63.8
Below Mattie Canyon (59F)	5.0	66.0	5.9	10.8	39.6	3.1	37.0	17.3	12.5	2.8
Below Pump Canyon (59D)	29.7	51.6	0.0	16.8	28.2	1.3	42.1	29.4	0.0	0.8
Fresno to Apache Canyon (59B)	13.3	50.4	0.0	5.3	51.7	4.3	34.3	38.5	0.7	1.5

Table 3-12. Pool Habitat Development by Segment for Cienega Creek, 1990 and 2000

	Pools per Mile (All)		**Pools (>2' Deep) per Mile**		**Percent of All Aquatic Habitat**	
Segment	1990	2000	1990	2000	1990	2000
Headwaters (above Gardner Canyon) (59M)	61	79	32	43	64	36
Below Mattie Canyon (59F)	12	43	3	40	5	66
Below Pump Canyon (59D)	29	124	4	57	30	52
Fresno to Apache Canyon (59B)	12	112	0	0	13	50

(78 mi^2) and lack of tributaries reaching higher elevations in nearby mountains where more rain falls. The sheltered existence of this segment from flood flows has produced an ecological site with fine sediments on shallow saturated banks and wide floodplains. The lack of disturbance of vegetation and bank soils from grazing has allowed dense accumulations of aquatic plants (e.g. deer grass, Spanish needles, Baltic rush, spike rushes), which filter out sediments and raise bank elevations. These actions in turn leave water with an increased capacity for moving sediment where sediments such as substrates are exposed on the bottoms of pool and glide habitats.

As plant density increases, so does the resistance to water movement. This resistance decreases the water's energy to transport sediment. The clean water leaving these areas has a low sediment load when it reaches areas with less resistance to flow such as pools and glides. In this way the differential in channel roughness created by plants is causing deposition of sediment where plants can root in shallow areas. This differential is also increasing bed scour where plants cannot establish in great densities such as in pools and glides. Glides may actually be converted to pools as they are excavated by floods changing the nature of the habitat.

The Headwaters segment has a low slope (about 0.5%) and lacks large flood flows and large sediment particles, such as cobble and rubble, to remove vegetation. Fencing the segment has also sheltered herbaceous vegetation and trees from disturbances by livestock.

The Mattie Canyon segment showed an increase in the area of pools as well as the number and depth of pools (Table 3-11 and 3-12). Over the 10-year period riffle and marsh habitat both decreased while run and glide habitats increased. In contrast to the Headwaters segment, the Mattie Canyon segment showed a 86% decrease in vegetation cover in open habitats, but a five-fold increase in overhanging cover during the same 10-year period (Table 3-13). Undercut banks increased dramatically because none were detected in 1990.

In contrast to the Headwaters segment, the processes in the Mattie Canyon segment differ mainly because of a larger watershed size (202 mi^2) and inputs from upstream tributaries that reach into higher elevations where more rain falls. Flood flows and sediment have produced ecological sites with a mixture of fine and coarse sediments on shallow banks and wide floodplains. Though the disturbance regime is much greater than for the Headwaters segment, dense accumulations of aquatic plants (e.g. deer grass, Spanish needles, Baltic rush, spike rushes) have developed on floodplains, and to a lesser degree in the channels.

This denser vegetation on the floodplain filters sediments, raising bank elevations and increasing the water's capacity to move sediment. "Hungry" water can then scour exposed sediment such as the substrates of pool and glide habitats. In addition, increased woody debris along Cienega Creek allows flood waters to create areas of turbulence around logs and tree roots, forming backwater pools. This habitat type was rarely found in 1990. In this way existing channel features such as pools and glides may be deepened while other locations remain shallow, bound by root masses across the bottom of the channel or coarse sediment deposits on habitats such as runs and riffles.

Although the Mattie Canyon segment has a low slope (about 0.5%) like the Headwaters segment, disturbance is increased by larger flood flows from a larger watershed and larger sediment particles such as gravel and cobble, which can remove less durable components of herbaceous vegetation. This greater capacity for disturbance, coupled with a large degree of tree canopy (i.e. overstory), which shades the stream, has resulted in less herbaceous instream cover and increased cover overhanging the water's surface.

Table 3-13. Some Key Aquatic Habitat Characteristics for Cienega Creek, 1990 and 2000

	Instream Cover Square Feet/Mile		**Overhanging Cover Square Feet/Mile**		**Undercut Banks Running Feet/Mile**	
Segment	1990	2000	1990	2000	1990	2000
Headwaters (above Gardner Canyon) (59M)	1,343	13,472	424	4,231	0.0	789
Below Mattie Canyon (59F)	27,388	3,819	741	3,941	0.0	538
Below Pump Canyon (59D)	3,344	5,176	469	7,362	0.0	750
Fresno to Apache Canyon (59B)	2,591	297	51,801	4,794	0.0	18

The Pump Canyon segment showed an increase in the area of pools and the number and depth of pools (Tables 3-11 and 3-12). Riffle and glide habitat both decreased while marsh habitat slightly increased. This segment also showed a 1.5-fold increase in vegetation cover in pools and a 16-fold increase in overhanging cover (Table 3-13). Undercut banks increased in that none were detected in 1990. The Pump Canyon segment functions much as the Mattie Canyon segment except that Pump Canyon has a slightly larger watershed (211 mi^2) and an immature tree gallery that does not create the level of shade that limits herbaceous plant growth.

The Fresno Canyon segment showed an increase in area and number of pools (Tables 3-11 and 3-12). But depths remain relatively shallow. Run habitats increased while glide habitats remained relatively static. Marsh habitat doubled, yet still amounted to only 1.5% of all aquatic habitats. This segment showed a 89% decrease in aquatic vegetation cover over 10 years and a 91% decrease in overhanging cover. Undercut banks increased in that none were detected in 1990.

The Fresno Canyon segment functions much as do the Mattie Canyon and Pump Canyon segments except that Fresno Canyon has a slightly larger watershed (223 mi^2) and a large load of coarse sediments. These coarse sediments create a filling and scouring dynamic that limits the developing of habitat and establishing of herbaceous aquatic plants. This segment also has a larger degree of disturbance than the other segments. This disturbance, coupled with a large degree of mature tree canopy (i.e. over story) that shades the stream, has resulted in less herbaceous instream cover and decreased cover overhanging the water's surface.

FISH AND WILDLIFE

The quality and diversity of vegetation communities contribute to the planning area's value as wildlife habitat. Wildlife habitat attributes, including vegetation structure, plant species composition, and the presence or absence of physical features, determine wildlife presence and abundance in any given area. The high diversity of fish and wildlife species within the planning area results from the habitat diversity, including the presence of several rare plant communities (Table 3-14).

Table 3-14. Species Richness, Empire-Cienega Planning Area

Taxonomic Group	Number of Species
Mammals	60
Birds	230
Reptiles and Amphibians	43
Fish	3
TOTAL	**336**

The riparian areas along Cienega Creek and its tributaries provide breeding, foraging, watering, resting, and escape cover as well as travel corridors for a variety of wildlife. Riparian habitats are important to wildlife in desert environments. Although never abundant, these habitats in Arizona have also been dramatically reduced by a variety of human impacts. Many of the federally listed and other special status species entirely or partially depend on riparian habitats. The relatively large,

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high-quality riparian habitats within the planning area have contributed to the presence of many special status species.

Three native fishes inhabit Cienega Creek and Mattie Canyon: the endangered Gila topminnow; the Gila chub–a federal candidate species–and the longfin dace. Lowland and Chiricahua leopard frogs, Sonoran mud turtles, and Mexican garter snakes inhabit several locations in Empire Gulch and Cienega Creek (Rosen 1996; BLM files). Lowland leopard frogs and Sonoran mud turtles can be found in Nogales and Little Nogales springs and Wakefield Canyon. Incidental observations and literature reviews document the presence of six more species of amphibians and 33 species of reptiles within the planning area. (See Appendix 3, Annotated Checklist of Fish, Amphibians, and Reptiles.)

More than 230 bird species have been documented in the planning area, including both resident and migratory species and such special status species as the gray hawk, osprey, southwestern willow flycatcher, yellow-billed cuckoo, green kingfisher, and Baird's sparrow. (See Appendix 3, Checklist of Birds.) At least five species of raptors have been documented to nest in the riparian areas as well as great blue herons and many songbirds. Waterfowl use ponds and pools along the creek, and nesting Virginia rails have been found in the cienega habitat along its banks. The extensive open grasslands of predominately native grasses provide both breeding and wintering habitat for the rare grasshopper sparrow and wintering habitat for the Baird's sparrow. Both of these species are Arizona wildlife of special concern. These grasslands also provide foraging habitat for resident and migratory raptors, such as the Swainson's and ferruginous hawks.

Also known to inhabit the area are 25 big-game, small-game, and predatory mammals; 27 small-mammal species, and eight bat species. (See Appendix 3, Mammal Species.)

The foothills of the Whetstone and Empire mountains, as noted by James Bartlett in 1852, once provided excellent habitat for pronghorn, mule deer, and white-tailed deer (Davis 1982). These species have been in decline due to human encroachment, drought, and reduction in natural water sources. Pronghorn were extirpated from southeast Arizona by the 1920s and were reintroduced in the planning area by the Arizona Game and Fish Department in 1981 (AGFD 1981). Recent surveys place the population at about 100, but survival of pronghorn fawns has been low in recent years (Sacco 1999). Mule deer populations have undergone regional declines, and both white-tail and mule deer have undergone changes in local distribution.

A variety of other mammals also inhabit the planning area. Cottontail are common in shrubby habitats, and black-tailed jackrabbits occur in open habitats. Raccoon and porcupine are found most often in riparian areas. Coatimundi inhabit dry canyons and riparian areas. Ringtail are found on rocky hillsides, usually near crevices, caves, mine shafts, and abandoned buildings. Predatory mammals include the mountain lion, bobcat, coyote, and grey fox.

The endangered lesser long-nosed bat and the Mexican long-tongued bat (BLM sensitive) forage on agaves, which are present in varying densities on loamy hills ecological sites. Other bats are attracted to the abundance of insects along riparian areas.

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THREATENED, ENDANGERED, AND SPECIAL STATUS SPECIES

Thirty-seven special status fish, wildlife, and plant species occur or have the potential to occur within the planning area. Included are the following:

- 11 federal candidate, threatened, or endangered fish, wildlife, and plant species (Table 3-15).
- 15 species proposed to be listed as wildlife of special concern in Arizona (AGFD in preparation) (Table 3-16).
- 11 species classified as BLM sensitive (3-17).

These special status species mainly inhabit the planning area's rare riparian and grassland habitats.

Threatened and Endangered Fish and Wildlife Habitat Conditions and Inventory

Lesser Long-Nosed Bat

The lesser long-nosed bat, a federally listed endangered species, is a medium-sized nectar, pollen, and fruit eating bat that migrates seasonally from Mexico to southern Arizona and southwest New Mexico. This bat has a small triangular noseleaf, relatively small ears, and no tail. It ranges in southern Arizona from the Picacho Mountains southwest to the Agua Dulce Mountains, southeast to the Chiricahua Mountains, and south from Arizona throughout the drier parts of Mexico. The lesser long-nosed bat feeds on the fruits of columnar cacti and paniculate agave (USFWS 1988).

The lesser long-nosed bat roosts in caves and abandoned mines. The number of individuals per roost varies from a few to thousands. These bats begin dispersing from maternity roosts in mid-July. From July through September on a transient basis they occupy a diverse series of roosts from high to low elevations. By late September these bats vacate Arizona and move into Mexico (USFWS 1988).

The planning area's loamy hills ecological sites support moderate to high densities of paniculate agaves, which are the main food source for migrating lesser long-nosed bats in late summer and early fall.

Simms and Dalton (1988) conducted a light-tagging study of lesser long-nosed bats in the planning area in September 1998. The objective of the study was to locate migratory day roosts of these bats. Another objective was to learn more about foraging territory and distances. During two nights of netting, the researchers captured and equipped 29 lesser long-nosed bats with chemiluminescent light tags. Observers tracked one of the bats to a known migratory roost in the Patagonia area, a distance of about 15 miles from the capture site. Other bats were documented foraging at hummingbird feeders in the planning area up to 15 miles from their capture location. The study found one new migratory roost. Several lesser long-nosed bat migratory roosts occur within 50 miles of the planning area.

Jaguar

The jaguar is the largest species of cat native to the Western Hemisphere and was recently listed as endangered in the United States. Jaguars are cinnamon-buff in color with many black spots. Melanistic forms are also known, mainly in the southern part of their range. Jaguar range in North America includes Mexico and portions of the southwestern United States. A number of jaguar records are known from Arizona, New Mexico, and Texas (USFWS 1997a).

Table 3-15. Federally Listed or Candidate Species with Historic or Current Occurrences in the Cienega Creek Basin

Name	**Federal Status**	**Habitat and Presence**
Gila topminnow *(Poeciliopsis occidentalis occidentalis)*	FE	Pools, cienegas, backwaters, seeps, and springs. Present in Cienega Creek, Empire Gulch, and Mattie Canyon
Gila chub (*Gila intermedia*)	FC	Deep pools with overhanging banks/cover. Present in Cienega Creek and Mattie Canyon.
Desert pupfish (*Cyprinodon macularius*)	FE	Small, shallow pools, cienegas, backwaters, seeps, and springs. Historically present in the Santa Cruz and San Pedro river drainages. One reintroduced population is present in pond on private land within planning area. Proposed for reintroduction.
Chiricahua leopard frog (*Rana chiricahuensis*)	FP	Pools in stream channels and isolated pools at seeps and springs. Present recently in Cienega Creek, Empire Gulch, Mattie Canyon, and off-channel ponds. Declining numbers. Proposed for listing as threatened species.
Bald eagle (*Haliaeetus leucocephalus*)	FT	Large, open bodies of water for foraging; large trees or snags or cliffs for nesting. Transient in planning area.
Northern aplomado falcon (*Falco femoralis septentrionalis*)	FE	Open grassland habitats with scattered trees/yucca for nesting and perches. Extirpated.
Southwestern willow flycatcher (*Empidonax traillii extimus*)	FE	Dense willow and cottonwood habitats along streams with perennial water. Migratory individuals documented but no breeding pairs confirmed in planning area. Suitable habitat is present along Cienega Creek.
Lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*)	FE	Forages on agave in upland grassland habitats. Confirmed presence in planning area.
Jaguar (*Felis onca*)	FE	May use dense vegetation in river bottoms for foraging and travel corridors. Historical records from mountains next to planning area but no current records.
Canelo lady tresses orchid (*Spiranthes delitescens*)	FE	Present in drainages near planning area but not documented along Cienega Creek or tributaries.
Huachuca water umbel (*Lilaeopsis schaffneriana* ssp. *recurva*)	FE	Early successional species requiring periodic flooding and opening of streamside habitat and sand deposition. Has been found in Empire Gulch.

FE = Federally listed as endangered. FT = Federally listed as threatened. FP = Proposed for federal listing.
FC = Candidate for federal listing. All species are also on the wildlife of special concern in Arizona (WSCA) list, (draft) Arizona Game and Fish Department.

Table 3-16. Proposed Wildlife of Special Concern in Arizona Occurring or Likely to Occur in the Empire-Cienega Planning Area

Name	**Habitat**	**Presence**
Mexican garter snake (*Thamnophis eques*)	Perennial stream segments and marshes along Cienega Creek and tributaries.	PC
Bunch grass lizard (*Sceloporus scalaris*)	Desert grassland.	PL
Lowland leopard frog (*Rana yavapaiensis*)	Perennial streams, springs, and pools within Cienega Creek watershed.	PC
Azure bluebird (*Sialia sialis fulva*)	Oak woodland, mainly in winter.	PL
Yellow-billed cuckoo (*Coccyzus americanus*)	Cottonwood-willow riparian areas along Cienega Creek and tributaries.	PC
Ferruginous hawk (*Buteo regalis*)	Occasional visitor, foraging in grassland habitats.	PC
Northern goshawk (*Accipter gentilis*)	Vagrant, usually dense coniferous forest.	PC
Swainson's hawk (*Buteo swainsoni*)	Regular breeder, grassland habitats.	PC
Green kingfisher (*Chloroceryle americana*)	Perennial streams, rare to regular visitor.	PC
Sprague's pipit (*Anthus spragueii*)	Desert grassland, open valley bottoms.	PC
Baird's sparrow (*Ammodramus bairdii*)	Desert grassland swales.	PC
Arizona grasshopper sparrow (*Ammodramus savannarum ammolegus*)	Desert grassland swales. Summer breeding population of particular concern.	PC
Western red bat (*Lasiurus blossevillii*)	Cottonwood willow riparian areas along Cienega Creek and tributaries.	PC
Townsend's big-eared bat (*Plecotus townsendii*)	Roosts in caves/mines, forages on insects in uplands or over water.	PC
Black-tailed prairie dog (*Cynomys ludovicianus*)	Open, desert grasslands.	EX

PC = Presence confirmed. PL = Presence likely. EX =Extirpated.

Table 3-17. BLM Sensitive Species Within Empire-Cienega Planning Area

Name	Habitat	Presence
Longfin dace	Pools and riffles in perennial streams.	PC
Texas horned lizard	Desert grassland.	PC
Gray hawk	Cottonwood willow galleries next to mesquite woodland. Population increasing in planning area.	PC
Burrowing owl	Open grassland in association with black-tailed prairie dog or kangaroo rat mounds.	PL
Loggerhead shrike	Grassland, open habitats.	PC
Cave myotis	Roosts in large numbers in caves/mines and forages on insects in uplands and over water.	PC
Fringed myotis	Roosts in large numbers in caves/mines and forages on insects in uplands and over water.	PC
California leaf-nosed bat	Roosts in large numbers in caves/mines and forages on insects in uplands and over water.	PC
Mexican long-tongued bat	Roosts may vary from crevices to caves, usually small numbers. Forages on nectar from agaves and other plants.	PC
Huachuca golden aster *(Heterotheca rutteri)*	Open grassland, disturbed and undisturbed sites. Documented at one locale within planning area but much more potential habitat exists.	PC
Needle spined pineapple cactus (*Echinomastus [= Neolloydia] erectocentrus* var *erectocentrus*)	Open sites dominated by desert grassland, chaparral, or mixed shrub vegetation on soils derived from limestone alluvium.	PL

PC = Presence Confirmed. PL = Presence Likely.

There are historic records of jaguar from the Santa Rita and Whetstone mountains (Girmendonk 1994; Hoffmeister 1986), which border the planning area. Jaguar may use the planning area as a movement corridor, but confirmed sightings in the United States are extremely rare.

Aplomado Falcon

The aplomado falcon is a federally listed endangered species. It is a medium-sized falcon, similar in size to the peregrine falcon. It has a moustache similar to the peregrine's but, unlike the peregrine, has a white line through its eye. When viewed from below, the aplomado falcon has a black belly contrasted by a pale throat and a orange-brown thigh. Aplomado falcons do not build their own nests but use abandoned nests of hawks and ravens. These falcons nest in small trees such as mesquite and catclaw. Their prey consists mainly of small birds, but they may also eat winged insects, bats, rodents, and reptiles. Falcon distribution and reproduction may be influenced by available nest sites and abundance of small birds (USFWS 1990).

Aplomado falcons inhabit grasslands and savannas of Latin America. They formerly inhabited desert grasslands and coastal prairies of Texas, New Mexico, and southeast Arizona. In the United States, historic habitats consist of open grasslands with scattered yuccas and mesquites. The species will also occupy oak savannas, pine savannas, desert grasslands, and riparian woodlands (USFWS 1990). The aplomado falcon is one of six desert grassland priority species named in the Arizona Partners in Flight Bird Conservation Plan (Latta and others 1999).

Corman (1992) surveyed the planning area for potential reintroduction sites for the northern aplomado falcon. Three transects were surveyed and rated suitable for potential reintroduction. One transect was along Cienega Creek, and two were in Fortynine Wash. The planning area was considered to be the best of several potential reintroduction sites in Arizona.

Bald Eagle

The bald eagle was recently down-listed from endangered to threatened. Adult bald eagles are large birds with white heads and tails. Immature bald eagles are dark brown with varying degrees of white molting. Their feet and legs are bare of feathers. Bald eagles require large trees, snags, or cliffs within 13 miles of water for nesting, with abundant fish and waterfowl for prey. Fish is their main food source, but waterfowl, small mammals, and carrion are also important food items for breeding, wintering, and transient eagles. Bald eagles breed and migrate through northern and central Arizona, but mainly winter and migrate in southern Arizona.

The planning area does not provide suitable habitat for bald eagles because it lacks large riverine, lake, or reservoir habitats, which provide prey species and nesting substrates. Although transient bald eagles occasionally may visit the planning area, regular visits are considered unlikely.

Southwestern Willow Flycatcher

The southwestern willow flycatcher is a federally listed endangered species. It is a small, migratory, and riparian obligate bird that nests along rivers, streams, and other wetlands, where dense growths of willow, buttonbush, boxelder, tamarisk, or other plants are present, often with a scattered overstory of cottonwood and/or willow. This species is an insectivore, foraging within and above dense riparian vegetation, taking insects on the wing or gleaning them from foliage (USFWS 1993b).

Southwestern willow flycatchers begin arriving on breeding grounds in late April and May. They begin nesting in late May and early June and fledge young from late June through mid-August. They nest in thickets of trees and shrubs 13 to 23 feet tall, with a high percentage of canopy cover and dense foliage from 0 to 13 feet above ground. The plant community at nest sites is typically even-aged, structurally homogeneous, and dense (USFWS 1993b). The southwestern willow flycatcher is one of four bird species named as low-elevation riparian priority species in the Arizona Partners in Flight Bird Conservation Plan (Latta and others 1999).

In 2000 BLM completed an inventory of southwestern willow flycatcher habitat along Cienega Creek and Empire Gulch. The inventory found 4 miles of Cienega Creek having suitable habitat and 9.5 miles of Cienega Creek and Empire Gulch having potential habitat (Appendix 3, Willow Flycatcher Habitat Assessment and Surveys). Much of the potential habitat consisted of relatively even-aged stands of willows that had matured to the point where they lacked sufficient density of understory vegetation. Some type of disturbance to open up these areas to new growth is probably needed to return them to suitable habitat, which is an earlier successional stage.

A volunteer bird-banding project captured migrant willow flycatchers in 1988, 1989, 1990, 1992, and 1993 along the Agricultural Field portion of Cienega Creek (under master permit 29108). The project captured no willow flycatchers in breeding status. And willow flycatcher surveys using established protocols along several reaches of Cienega Creek in 1994 found none of these birds (Appendix 3). The Agricultural Fields section of Cienega Creek (segment 591) was re-surveyed in 1998-2000 for a stream restoration project, but again no willow flycatchers were detected.

Chiricahua Leopard Frog

The Chiricahua leopard frog is proposed for federal listing as a threatened species. It is a medium-sized frog from 2.5 to 4 inches long, having on the rear of its thigh a distinctive pattern of small, raised, cream-colored spots or tubercles on a dark background. These frogs occur in Santa Cruz, Apache, Gila, Pima, Cochise, Greenlee, Graham, Yavapai, Coconino, and Navajo counties at elevations from 3,000 to 8,300 feet. They inhabit a wide variety of aquatic habitats, including streams, rivers, backwaters, cienegas, ponds, and stock tanks that lack bullfrogs and non-native fish. They prefer habitats with permanent water. Adults are typically active from April until November, often breeding after seasonal rains (USFWS 2000; Stebbins 1966).

Like other leopard frogs, Chiricahua leopard frogs have experienced alarming declines in recent years. Surveys from 1983 through 1987 found Chiricahua leopard frogs in only 2 of 36 sites where the species had previously been recorded (Clarkson and Rorabaugh 1989). The species can be described as declining, low in number, and limited to a few locations. Major threats to the species include predation, possible competition with non-native aquatic species, and loss or altering of aquatic habitats (USFWS 2000).

Both lowland and Chiricahua leopard frogs have been found in several locations in the planning area, including Cienega Creek, Empire Gulch, Mattie Canyon, and off-channel ponds (BLM files; Rosen 1996). BLM biologists routinely captured leopard frogs (tadpoles and adults) while surveying aquatic habitats and sampling fish in Cienega Creek during the early 1990s. Since that time leopard frogs have been found much less often although habitat for both species has increased in Cienega Creek within the last 10 years.

Gila Topminnow and Gila Chub

The Gila topminnow, a federally listed endangered species, is a small fish (less than 2 inches long) inhabiting river basins in Arizona, New Mexico, and Sonora, Mexico. This fish typically inhabits lower elevation (below 1,500 m) springs, streams, and the margins of larger water bodies, where it shows an affinity for emergent or aquatic vegetation. The species tends to congregate in shallow waters or near the surface of deeper ones. Where cold temperatures occur regularly, Gila topminnows are generally restricted to waters that do not freeze, such as constant-temperature springs or areas fed or influenced by these springs (Schoenherr 1974).

Gila topminnows feed on organic detritus, algae, and other plants and on invertebrates such as crustaceans and insects, including the larvae of mosquitos. They give birth to live young. The number of young varies with the fluctuating habitat conditions and size of the adults (Schoenherr 1974)

A candidate for federal listing, the Gila chub is a large minnow that grows as large as 7-8 inches long. Gila chub feed on small insects, small fish, and algae, and occupy smaller streams and cienega-type habitats. They are a highly secretive fish and live in deeper water or near cover (Griffith and Tiersch 1989).

Gila chub are found only in the Gila River basin and historically occurred in springs and small streams in Arizona, New Mexico, and Sonora. Today, they are found in fewer than 15 streams in central and southern Arizona and are abundant at no more than 10 of these locations (Griffith and Tiersch 1989).

Considered the finest remaining natural habitat for the endangered Gila topminnow, Cienega Creek was classified as Category I habitat by the Arizona Game and Fish Department (Simons 1987). Cienega Creek also has one of the largest remaining populations of Gila chub. Cienega Creek is particularly significant in that it has no exotic fish species. Recent expansions of bullfrogs within the watershed and their presence in Cienega Creek are raising concerns about possible impacts to native fish and leopard frogs.

Fish inventories of Cienega Creek and its tributaries, Mattie Canyon and Empire Gulch, have been conducted since 1989 by seining, electrofishing, and visual observation. Topminnow populations vary widely from season to season and year to year. In 1989 the estimated fall population of Gila topminnow was 2.5 million, conservatively (Simms and Simms 1992).

Upper Cienega Creek above Gardner Canyon is relatively isolated from large sediment loads and large floods. Thermal fluctuations along this reach are moderated by incoming groundwater, which adds a stable temperature to the surface flow. Nonetheless, topminnow populations fluctuated greatly. Topminnow density ranged from 0.5 to 101 per 10 ft^2 during 1989-1997 but was generally above 20 fish per 10 ft^2 (Table 3-18). The reduction of topminnow numbers in the fall of 1993 was most likely a result of intense flooding, estimated to have exceeded a 100-year flood.

Table 3-18. Population Trend Data Collected During 1989-1996 for Gila Topminnow along Upper and Lower Cienega Creek

Upper Cienega Creek (above Gardner Canyon)				**Lower Cienega Creek (below Gardner Canyon)**			
Year	$\bar{x}$/10ft^2	Range	# Sites	Year	$\bar{x}$/10ft^2	Range	# Sites
1989	21.2	--	1	1989	10.90	0.04-29	5
1990 W	58.5	2.80-114.0	2	1990 W	1.10	0.00-6.5	12
1990 F	0.5	--	1	1990 F	4.10	3.80-4.4	2
1992	101.5	--	1	1992	18.00	0.80-26.2	3
1993	10.2	6.40-13.9	2	1993	0.82	0.00-3.6	6
1994	31.7	0.78-62.0	2	1994	7.10	1.40-20.2	6
1995	53.2	13.8	2	1995	11.20	0.08-33.0	5
1996	no data	--		1996	10.90	2.10-18.1	6
1997	15.8	9.5-22.0	2	1997	--	--	--

Trend from catch per unit area, one pass seining, at several sample sites. Only pool and glide habitats sampled. Sampled in fall except for 1990, which was sampled in late winter (W) and fall (F).

In Cienega Creek below Gardner Canyon sediment input and flood flows increase. Habitats fluctuate more and pools seem transient. Thermal conditions are more variable except at the confluence with Mattie Canyon, where groundwater moderates the fluctuation in water temperatures. Topminnow densities fluctuate greatly. The number of topminnow ranged from 0.82 to 18 per 10 ft² (Table 3-18).

The unusually cold winter of 1989/1990 may have greatly reduced topminnow numbers in lower Cienega Creek. Five sites were compared in the fall of 1989 with those in the late winter of 1990. The Headwaters site showed a 303% increase in topminnow numbers from fall to late winter. The other sites showed an 87-99% decrease in topminnow numbers.

Observations over two winters found that topminnows suffer substantial mortality when temperatures fall below 10°C. At Headwaters Spring, the warmer groundwater during the harsh winter may have provided a refugium for the Gila topminnow. Topminnow numbers similarly declined in 1993, when extreme flooding for more than a week scoured the lower reaches of Cienega Creek. Flooding reduced the Cienega Creek topminnow population in the upper creek, but the upper creek still had densities 10 times that of the lower creek.

The composition of the fish community in Cienega Creek varies from its upper to lower reaches as well as from year to year. Topminnow make up more than 90% of the fish community in some years, but averaged 78% during the 8 years of record. Longfin dace composed up to 57% of the fish community with an average of 21% (Table 3-19). Fish sampling is difficult in Cienega Creek because of the large volume of vegetation cover, great pool depths, and undercut banks. Seining data reflect only the relative abundance for two fish species because Gila chub are effectively captured only by electrofishing. But seining did produce a substantial number of juvenile chub (<90mm TL), showing that these fish are reproducing at an acceptable level for recruitment (Table 3-19).

Visual observations and electrofishing data show that a large population of adult Gila chub occupies all perennial segments of Cienega Creek. Visual observations of adult Gila chub made for the aquatic habitat inventory in 1989-1990 found 368 chub along the perennial length of Cienega Creek. This estimate is undoubtedly low due to water turbidity in some reaches, vegetation cover, and the secretive nature of Gila chub.

Mattie Canyon supports typical riffle-pool type habitat with large numbers of longfin dace and Gila chub. Gila topminnow occur in small localized groups and are generally uncommon in this tributary.

Empire Gulch supports a marsh habitat with a few large, deep pools that support mud turtles and leopard frogs. Gila topminnow have also been recorded in Empire Gulch near its confluence with Cienega Creek. Although isolated from lower Empire Gulch by several miles of dry streambed except during flooding, upper Empire Gulch Spring has been found to have suitable habitat for reintroducing Gila topminnow. An environmental analysis is being completed for a reintroduction effort.

Cinco Canyon has seven natural ponds, five of which are perennial. These shallow ponds do not support fish but do support Sonoran mud turtles, breeding rails, breeding ducks, and leopard frogs. The ponds have been proposed as potential reintroduction sites for Gila topminnow.

In 1988 the Arizona Game and Fish Department reintroduced Gila topminnow into Nogales and Little Nogales springs near Wakefield Canyon,

Table 3-19. Relative Abundance of Fish Collected During 1989-1997 for Cienega Creek, Pima County, AZ

Cienega Creek Seining Data					
	# Sites	**Percentage of Fish Community**			
Year	**Sampled**	Gila Topminnow	Longfin Dace	Gila Chub - Mainly Juveniles	**TOTAL**
1989	6	92.0	7.6	0.4	**100**
1990W	12	78.5	21.4	0.1	**100**
1990F	3	75.5	24.4	0.1	**100**
1992	4	86.4	13.5	0.1	**100**
1993	8	41.6	57.5	0.9	**100**
1994	8	82.5	16.4	0.1	**100**
1995	7	91.4	8.1	0.5	**100**
1996	7	78.4	21.2	0.4	**100**
MEAN% (std.D.)		78.4 (16)	21.3 (16)	0.3 (0.3)	**100**

Seining data based on multiple passes until site was depleted. Only pool and glide habitats were sampled. Sampled in fall except for 1990 when sampled in late winter (W) and fall (F).

another tributary to Cienega Creek. These transplants appear to have failed, but these springs still provide habitat for future reintroductions (Weedman and Young 1995).

Desert Pupfish

The desert pupfish, federally listed as endangered, is a small (1.5 inch long) desert fish that inhabits springs, seeps, shallow pools, and backwaters in the Colorado River and Rio Sonoyta drainages (Schoenherr 1988; USFWS 1993a). Pupfish feed on small crustaceans, insects, and other invertebrates; worms; mollusks; aquatic macrophytes and algae; and detritus. These fish reproduce when water temperatures exceed 20°C. Males are territorial and may spawn with several females. Desert pupfish only inadvertently care for their eggs and young as a result of their relentless habit of driving out other male pupfish and other fish species from their territories.

One reintroduced population is present in a pond on private land within the planning area. Pupfish are being considered for possible reintroduction in the planning area, but no specific sites for reintroduction have been evaluated.

Special Status Fish and Wildlife Habitat Conditions and Inventory

BLM has not conducted specific surveys or evaluated habitat conditions for many of the Arizona wildlife of special concern or recently listed BLM sensitive species that occur or are likely to occur in the planning area. Studies by other agencies or independent researchers have produced information on occurrences or habitat for some of these species. Appendix 3, Special Status Species Summaries, briefly summarizes the habitat requirements and distribution of these species.

Lowland Leopard Frog, Mexican Garter Snake, and Longfin Dace

Occurrence data and some habitat data for lowland leopard frog and Mexican garter snake (both Arizona wildlife of special concern) and long-fin dace (BLM sensitive) have been collected during the surveys and habitat monitoring for Gila topminnow and Gila chub (BLM files).

Yellow-Billed Cuckoo

The yellow-billed cuckoo is an Arizona wildlife of special concern and is one of four bird species named as low-elevation riparian priority species in the Arizona Partners in Flight Bird Conservation Plan (Latta and others 1999). Surveys for yellow-billed cuckoo were conducted along portions of Cienega Creek in 1998-1999 (Corman and Magill 2000). In 1998, 14 pairs of cuckoos were detected along 14 km of survey, representing 19.2% of Arizona's population of cuckoos. In 1999, 12 pairs of cuckoos were detected along 15 km of survey, representing 7.3% of Arizona's population of cuckoos.

Gray Hawk

The gray hawk is a BLM sensitive species that nests in cottonwood-willow riparian areas next to dense patches of mesquite woodland. BLM biologists surveyed raptor nests along Cienega Creek and Empire Gulch in 1989 and 1991. One pair of nesting gray hawks was detected during these surveys and since then has been confirmed to nest in the same general area every year. In 1999 three pairs of nesting gray hawks were detected, showing an expansion in the breeding population (BLM files).

Baird's Sparrow and Grasshopper Sparrow

The Baird's sparrow and Arizona grasshopper sparrow are both Arizona wildlife of special concern and are two of the six bird species named as desert grassland priority species in the Arizona Partners in Flight Bird Conservation Plan (Latta and others 1999). Populations of both species are in serious decline in the United States. The Arizona grasshopper sparrow is a local breeding race with a very limited breeding distribution in southeast Arizona. The population is supplemented with individuals from northern subspecies during winter. Baird's sparrow has undergone statistically significant declines in population in the last 30 years (Krueper 2000).

Researchers are studying habitat relationships of both sparrow species at study sites in the planning area. A stable population of wintering Baird's sparrow and a small stable population of breeding Arizona grasshopper sparrows are present at the area's southern end. Enough habitat quantity and quality seem to be present to maintain these populations. Both species seem to tolerate low to moderate grazing within their habitats. But heavier grazing (or even low-to-moderate grazing in drought years) can degrade habitat condition and cause a loss of preferred microhabitats for nesting or thermal cover (Krueper 2000).

Threatened, Endangered and Other Special Status Plants

Although the planning area has a high diversity of plants, only four are considered of special concern for management.

Needle Spined Pineapple Cactus

The needle spined pineapple cactus (*Echinomastus [= Neolloydia] erectocentrus* var *erectocentrus*) is a former Category 2 federal candidate and now a BLM sensitive species found in eastern Pima, southeast Pinal, and Cochise counties. This plant is distributed generally from Vail east to the Little Dragoon Mountains and south to the Mule Mountains. Typically it grows on open sites dominated by desert grassland, chaparral, or mixed shrub vegetation. Most of the planning area north of the narrows appears to be suitable habitat for the species, which grows on bajadas and soils derived from limestone alluvium at 3,000 to 5,000

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feet in elevation. But no surveys for this species have been conducted (USFWS 1992).

Huachuca Golden Aster

The Huachuca golden aster *(Heterotheca rutteri)* is a BLM sensitive species that grows at 4,000 to 5,000 feet in elevation, almost exclusively in the open grassland. It grows at both disturbed and undisturbed sites with a preference for flat areas. It has been found mainly in the grasslands that abut the Huachuca, Patagonia, and Santa Rita mountains, and the San Rafael Valley at the headwaters of the Santa Cruz River. In 1997 the Huachuca golden aster was found in the planning area in the West Pasture on the Empire-Cienega allotment. The planning area has much more grassland that is potential habitat for the species, but surveys for the species have not been conducted in these areas (USFWS 1992).

Huachuca Water Umbel

The Huachuca water umbel (*Lilaeopsis schaffneriana* ssp. *recurva*) is federally listed as endangered. It is a herbaceous semi-aquatic perennial with slender pale green erect leaves growing from nodes of creeping shallow rhizomes, which branch freely and may form dense mats making individual plants hard to distinguish. Tiny flowered umbels arise from root nodes. The flowers are 1 to 2 millimeters wide with tiny maroon-tinted petals. Flowering has been observed from March through October (USFWS 1997b).

The Huachuca water umbel requires perennial water, gentle stream gradients, small to medium sized drainages, and apparently mild winters. It is usually found in water from 2 to 16 inches deep. A moderate flood frequency and the associated level of disturbance to other plant species are required to maintain the ecological niche for this species. But floods that are too frequent or intense can destroy populations. These plants are found in both unshaded and shaded sites. Associated plants include willows, alder, cottonwood, cattails, bulrushes, sedges, rushes, grasses, and watercress (USFWS 1997b).

The Huachuca water umbel has been found in Empire Gulch near its confluence with Cienega Creek. Potential habitat for the species is also found along Cienega Creek and Mattie Canyon.

Canelo Lady Tresses Orchid

The Canelo lady tresses orchid (*Spiranthes delitescens*) is a newly described species that, because of its rarity, has been federally listed as endangered. It is known only from three locations in Santa Cruz and Cochise counties in the San Pedro watershed. The orchid has linear-lanceolate grass-like leaves and a flowering stalk that is about 50 cm tall. The flower stalk contains about 40 white flowers positioned in a spiral at the top of the stalk. This orchid flowers from late July to early August, when temperatures range from 60°F at night to 100°F during the day. During that time, precipitation averages 15 to 20 inches (USFWS 1997b).

Canelo Hills lady tresses grows in cienegas and needs finely grained, highly organic, saturated soils. It is found intermixed with tall grasses and sedges at about 5,000 feet in elevation. The associated plant species include *Bidens*, *Carex*, *Juncus*, *Eleocharis*, *Typha*, and *Equisetum*. This species has not been found in Cienega Creek but does occur in other drainages nearby (USFWS 1997b).

VISUAL RESOURCES

Visual resource management (VRM) is a process BLM uses to identify and manage scenic quality and to reduce the impact of development on the scenery. The VRM system does the following:

- Evaluates the quality of existing scenery.

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- Considers the distance from which that scenery is viewed.

- Looks at people's sensitivity to changes in the landscape.

To manage visual resources, management classes have been developed to describe the degree of landscape modification permissible (Appendix 2, Visual Resource Management Classes).

Most of the Empire-Cienega Planning Area falls into a VRM Class II, which describes a landscape that is largely unmodified and scenic. Highway 83, which runs along the planning area boundary and crosses the planning area for 2 miles, is a designated scenic route in Arizona's State Highway System. The viewshed or scenery from Highways 82 and 83 and the main ranch road includes undisturbed panoramas of rolling grasslands with an average elevation of 4,500 feet against the dramatic backdrops of the mountain sky islands of Coronado National Forest: the 9,400 foot summit of Mt. Wrightson in the Santa Rita Mountains to the west and the 7,700 foot summit of Apache Peak in the Whetstone Mountains to the east. To the southeast is the distinctive hump of 6,300-foot Biscuit Mountain in the Mustang Mountains. To the north and south are the more gentle vistas of the Empire Mountains and the Canelo Hills.

The riparian vegetation of Cienega Creek and oak woodlands in other drainages create a dramatic green belt that magnifies the overall scenic quality of the rolling grass and oak- and agave-covered hills and offers sharp contrast to nearby views of desert scrub. Along Cienega Creek, however, is a limited area that farming has visually degraded.

Some vantage points along the interior roads of the planning area reveal arroyo cutting, abandoned water diversion structures, a 0.25-mile-long abandoned dirt airstrip, heavily trampled livestock watering holes, badlands topography, old dumps, and cut mesquite bosques. But these features do not detract from the planning area's overall scenic quality.

A 1-mile segment of Empire Gulch near the historic Empire Ranch headquarters consists of a visually spectacular Fremont cottonwood gallery forest. Views from the historic ranch house, especially the breezeway and bay window are generally unspoiled except for the Doplar radar tower in the Empire Mountains and the abandoned airstrip, which is occupied 5 to 10 times a year with small (1-20 vehicles) to large (20-70 vehicles) groups for periods of up to 2 weeks.

PALEONTOLOGICAL RESOURCES

Although no vertebrate fossil sites have been found in the planning area, several are located nearby. The fossilized remains of a previously unknown dinosaur species, *Sonorasaurus thompsoni*, were recently found near Sonoita. The bones of a late Pleistocene elephant have been reported in the Elgin School locality. And the remains of a Pleistocene horse were documented in the Empire Mountains. Similar sites may exist in the planning area. The planning area may also have invertebrate fossil deposits.

CULTURAL RESOURCES

In this plan the term cultural resources refers to nonrenewable remnants of the human past and definite locations of traditional cultural or religious importance to specific cultural groups.

Cultural resources documented in the planning area proper consist mainly of prehistoric,

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protohistoric, and historic archaeological sites and historic structures representing four cultural groups: Archaic/Early Agricultural, Hohokam, Sobaipuri, and Anglo-American. Cultural resources that are documented at nearby sites and that may exist in the planning area represent four other cultural groups: Paleo-Indian/Clovis, Apache, Spanish, and Mexican.

HUMAN OCCUPATION AND CULTURAL PROPERTIES

Paleo-Indian/Clovis (ca. 10,000 B.C. to 5,500 B.C.)

To date no evidence of Paleo-Indian/Clovis presence has been recorded in the planning area. But the bones of a late Pleistocene elephant recorded at a site near Elgin and those of a Pleistocene horse found in the Empire Mountains suggest that the types of big game animals killed by Clovis hunters in the nearby San Pedro Valley could have inhabited the planning area. If Clovis people did visit the planning area, it may have been at about the same time that they were hunting Pleistocene animals in the San Pedro Valley.

Archaic/Cochise/Early Agricultural (ca. 5,500 B.C. to A.D. 200)

Archaeologists do not know when humans first appeared in the planning area. The oldest evidence to date of human habitation in the planning area was recovered from two late Archaic pithouse village sites during excavations by archaeologists from the University of Arizona and the Arizona State Museum. Carbon-14 dating reveals that these sites were inhabited about 3,500 years ago by people who cultivated maize, squash, and beans. These foods supplemented a diet based on collected food products from wild plants, such as agave, lambs' quarters, amaranth, prickly pear, Emory oak, and mesquite, and on a variety of game such as deer, antelope, bighorn sheep, and rabbits (Eddy and Cooley 1983; Huckell 1990).

Many other Archaic sites have been documented in the planning area, but none have been dated. Some may represent an early Archaic culture known in southern Arizona as the Cochise. The Cochise based their subsistence on hunting and gathering and may have been among the earliest people in the Southwest to cultivate maize (corn). The Archaic sites in the planning area may provide important information about the transition from economies based on hunting and gathering to cultivation of domestic plants (Bronitsky and Merritt 1986; Eddy and Cooley 1983; Huckell 1990; Reid and Doyle 1986; Swanson 1951).

Hohokam (ca. 300 B.C. to A.D. 1450)

Archaeologists do not agree on the origin of the Hohokam culture. Some argue that this culture was a transformation from the late Cochise and occurred in the deserts and river valleys of southern Arizona and northern Mexico. Others maintain that the Hohokam culture was brought into Arizona during a rapid migration of people from northern Mexico. The Hohokam based their economy on cultivating maize, beans, and squash, and "encouraged" some wild plants such as agave, yucca, lambs' quarter, panic grass, and amaranth to grow by tending them much as they did their domestic crops. Rounding out the Hokokam diet were such game meat as deer, antelope, bighorn sheep, and rabbits and such wild plant foods as mesquite pods, cholla buds, and a variety of seeds.

Many Hohokam habitation and resource use sites have been documented in the planning area. Cultural materials found at these sites show that the Hohokam were present by around A.D. 500 and that they cultivated crops of maize and beans along the planning area's streams. They also harvested wild plant foods in both riparian and upland areas and hunted local animals and birds. Hohokam farmers in the planning area may have arranged systematically placed rock circles around the base of individual agave plants to collect and conserve water. Agave hearts were roasted in pits and then eaten. We do not know how long the Hohokam lived in the planning area (Bronitsky and Merritt 1986; Eddy and Cooley 1983; Huckell 1990; Reid and Doyle 1986; Swanson 1951).

Sobaipuri (ca. A.D. 1450 to 1770)

Pottery sherds tentatively identified as being of Sobaipuri origin have been found at several sites in the planning area. These sherds may represent pottery made by Sobaipuri, who actually lived at these sites. Or these sherds may be fragments of vessels acquired from Sobaipuri living elsewhere and brought to these sites by late Hohokam inhabitants. Jesuit Father Eusebio Kino's journals describe a Sobaipuri settlement of about 500 people established in 1698 near the headwaters of Sonoita Creek, a few miles southeast of the planning area. The Jesuits referred to this settlement as Los Reyes de Sonoitac. In 1951 Charles Di Peso excavated a Sobaipuri habitation site a short distance south of the planning area. Whether Sobaipuri Indians from these settlements were somehow involved with sites in the planning area is not yet known.

During the Spanish colonial period several Sobaipuri villages were located along the San Pedro River and the lower reaches of the Babocomari River. By the early 1770s Apache raids had forced most Sobaipuri to relocate to the Santa Cruz Valley.

Sobaipuri subsistence was based on cultivating domestic plants, collecting wild plant foods, and hunting. The Sobaipuri readily accepted livestock, domestic plants, and agricultural innovations introduced to them by Father Kino and later Spaniards (Bronitsky and Merritt 1986; Bolton 1948; Di Peso 1953; Seymour 1989; Sheridan 1995).

Western Apache (ca. A.D. 1693 to 1873)

The planning area lies in what was once territory claimed by the Western Apache Indians. One of the earliest historic references to the Apache dates to 1541. At that time Spanish explorers found living on the southern plains of New Mexico a nomadic people to whom they referred collectively as the Querecho. Later these people became known as the Apache.

Before the Pueblo Indian revolt against the Spanish in 1680, most Indians in the Southwest had only limited access to horses. During the revolt the Pueblos took thousands of horses from the Spaniards. Many other horses escaped into the wilds, where they were captured by Indians. After the revolt, many Indian tribes, including the Apache, rapidly adapted the use of horses into their cultures. With horses the Apache became highly mobile and rapidly expanded their territories.

Father Kino's records mention the appearance of Apaches north of the present day Gila River in 1693. Historic documents thereafter refer often to the Apaches, including the Aravaipa band of the Western Apache. South of the Gila River this band roamed over a wide swath of land that included the Empire, Cienega, and Sonoita valleys. The economy of the Western Apaches was based on nomadic, seasonal hunting and gathering and some plant cultivation. Because the Apache moved campsites often and did not establish permanent settlements, sites that they occupied tend to be ephemeral and difficult to find. No sites in the planning area have been recognized as being of Apache origin. But the probability is high that the

Apache hunted, collected wild plant foods, and camped in the planning area and that sites representing these uses will eventually be found (Basso 1971; Bronitsky and Merritt 1986; Sheridan 1995).

Spanish Colonial (ca. A.D. 1691 to 1821)/Mexican (ca. A.D. 1821 to 1854)

Although mining and ranching potential attracted interest, hostilities with the Apaches discouraged both the Spaniards and Mexicans from establishing permanent settlements in the planning area. Several land grants existed nearby, but no historic records have been found to show that land in the planning area was part of any formal Spanish or Mexican land grants. We do not know whether Spanish or Mexican cattle grazed in the planning area.

Father Kino's narratives state that in 1699 he took 150 head of cattle to the Sobaipuri settlement at Los Reyes de Sonoitac, where the Jesuits had established a "visita," later known as San Ignacio de Sonoitac. Sometime after 1759 the Jesuits built a small church there. Records do not show that this venture developed into a successful cattle-raising operation. In 1825 Don Leon Herreras, a prosperous ranchero living in Tubac, obtained the San Jose de Sonoita Land Grant, which covered more than 8,000 acres around Kino's visita. In 1832 Ignacio and Doña Eulalia Elias, citizens of Royon and Arispe respectively, obtained the San Ignacio del Babocomari Land Grant, which covered more than 34,000 acres south of the planning area. Both grants later went through a succession of ownerships (Bolton 1948; Di Peso 1953; Officer 1987; Sheridan 1995; Wagoner 1952; Wilson 1995).

Anglo-American (ca. A.D. 1854 to present)

The first Anglo-Americans to take up land near the planning area began arriving after the Gadsden Purchase was ratified in 1854. Their numbers increased gradually after the National Homestead Act was passed in 1862 and the American Civil War ended in 1865. By the early 1870s demand for beef by the military, mining settlements, and Indian reservations encouraged homesteading and the establishing of many small ranches in the Empire, Cienega, and Sonoita valleys. Droughts, rustling, and Apache raids caused many to fail. The Empire Ranch is among those that did survive and prosper well into the 20th century.

A 160-acre homestead owned by William Wakefield formed the nucleus of the Empire Ranch. Wakefield sold the land to Edward N. Fish and Simon Silverberg in June 1876. In August 1876 Fish and Silverberg sold the homestead to Walter L. Vail and Herbert S. Hislop. Both were in their mid-20s and had come to Arizona searching for land on which to establish a partnership cattle ranch. In October 1876 John N. Harvey joined the partnership, bringing capital for purchasing more land and livestock. Both Hislop and Harvey were from England, and Vail's family had settled in Nova Scotia before emigrating to New Jersey.

Locally, the trio's ranch became known as the "English Boys' Outfit." Hislop sold his shares to Vail in 1878. Vail and Harvey continued to acquire neighboring land until the ranch extended some 60 miles from north to south and 30 miles east to west. In 1881 Harvey sold his shares to Vail, who continued to develop and expand the business. Historic land records show that Vail bought out many homesteaders along Cienega Creek. When he died in 1906, the ranch covered almost 1 million acres.

In 1928 Frank S. Boice, Chairman of the Chiricahua Cattle Company, bought the Empire Ranch from the Vails. The Boices became well known in the Southwest for the purebred Hereford cattle they produced at the Empire Ranch. In 1969 the Boice family sold the ranch to Gulf American Corporation for proposed real estate development, which did not occur. Anamax Mining Company next bought the ranch lands for their mineral and water potential but did not develop these resources. A series of land exchanges in 1988 placed the land into public ownership under the BLM's administration as the Empire-Cienega Resource Conservation Area..

In November 1876 Hislop wrote a letter to his sister in London, England, stating that the small holding was called the Empire Ranch when he and Vail bought it and that an unfinished, four-room adobe house with an attached corral was included in the purchase (Fontana 1965). Exactly when this house was built has not yet been determined. Sawn lumber used as roof beams may have been cut at a nearby mill owned by Fish. Tree-ring dates from these beams may eventually provide an estimate as to when the house was built (Collins 1996; Dowell 1978; Fontana 1965; Pickrell 1961; Sheridan 1995; Soulliere-Harrison and Neidinger 1995; Stein 1990; Wagoner 1952; Wilson 1995; Zook 1994).

As his family and staff grew, Vail enlarged the house. By the late 1890s it contained at least 20 rooms and covered about 9,000 square feet of living space. Remodeling projects between 1900 and the late 1950s included the following:

- Adding gabled roofs, wooden shingles, and rolled roofing.

- Applying cement stucco to both interior and exterior walls.

- Installing electrical wiring and plumbing, propane and natural gas heating, sheet rock ceilings, carpeting, wood paneling, a large picture window, and wood and cement floors.

Today the house exhibits architectural features and home furnishing styles popular in rural Arizona between the territorial settlement period and post World War II. The Empire Ranch House is listed on the National Register of Historic Places.

Between 1876 and the mid-1890s a cluster of buildings was placed around the ranch house, forming the ranch headquarters. Other structures were built in the 1940s and 1950s. These buildings include three houses, an adobe barn, a tack shed, a horse barn, a grain shed, a machine shop, and a manger and stalls. A small swimming pool was built in 1939 or 1940. These buildings are eligible for listing on the National Register of Historic Places, possibly as a rural landscape. A brick house built north of the ranch in the 1960s would probably not meet the criteria for listing on the National Register. But this house would figure importantly in maintaining the integrity of the landscape and adaptive reuse (Soulliére-Harrison and Neidinger1995; Stewart 1970; Zook 1994).

The planning area has been used in historic times mainly for ranching and farming. A variety of livestock ranching structures and sites are dispersed around the area. This inventory includes corrals, several cabins, short-term camps, windmills, and watering tanks. Letters written by Walter Vail state that each year he hired Mormon farmers from Benson to cut hay at fields near Cienega Creek. Vail fed the hay to his horses and other livestock kept at the ranch headquarters. The farmers camped near the hay fields. Evidence of these camps may still exist (Dowell 1978).

Mining History

From 1880 to 1885 Walter Vail and partners profitably operated the Total Wreck Mine, at the northern end of the planning area. At its peak, this mine yielded more than 50 tons of ore per day. Equipped with twenty 950-pound stamps and 14 amalgamation pans, the Total Wreck mill could process from 65 to 70 tons of ore per day.

Today the mine is privately owned but not operating. The remnants of Total Wreck City, a settlement of about 300 people that grew up around the mine, are on adjacent Arizona State Trust Land. The settlement included more than 50 houses, three hotels, a brewery, four saloons, and several Chinese laundries. Walter Vail's brother Edward operated a butcher shop supplied with beef raised on the Empire Ranch. Remnants of a system used to pump water from Cienega Creek to the mine lie within the planning area (Dowell 1978).

Railroad History

A 4.5-mile segment of the historic Atchison, Topeka, and Santa Fe Railroad line crossed the northern end of the planning area. Construction of the Santa Fe Railroad through southern Arizona in the early 1880s provided a means to haul supplies and freight into the region and beef and ore out to distant markets. The railroad was a primary contributor to the development and success of ranching and mining in the Empire, Cienega, and Sonoita valleys. The railroad hauled thousands of cattle raised on the Empire Ranch to pastures and markets in California and Kansas. The railroad also shipped silver ore from the Total Wreck Mine to New York (Dowell 1978; Sheridan 1995).

Military History

Between 1856 and the mid-1880s U.S. Army cavalry troops regularly patrolled the Empire and Sonoita valleys. Many skirmishes with Apaches in the general vicinity of the planning area are documented. According to Hislop's and Vail's letters, cavalry troops sometimes camped near the Empire Ranch headquarters, and both men visited with the officers. Among the first army troopers who patrolled the area were those stationed at Fort Buchanan, which was built at the headwaters of Sonoita Creek in 1856 (Dowell 1978; Fontana 1965; Sheridan 1995).

NATIVE AMERICAN LOCATIONS OF TRADITIONAL CULTURAL AND RELIGIOUS IMPORTANCE

To date, no Native Americans have named any locations of traditional cultural or religious importance in the planning area. The Tohono O'odham claim ancestral affiliation with the Hohokam and Sobaipuri Indians who inhabited the planning area and surrounding land. The Hopi Indians also claim affiliation with the Hohokam and Sobaipuri. The Hopi include most of Arizona in their oral tradition about ancestral migration routes. San Carlos Apache elders have expressed interest in the planning area but have not yet named any specific resources or locations.

Both the Tohono O'odham and the San Carlos Apaches have expressed an interest in being allowed access to wild plants used for traditional medicinal, ritual, and utilitarian purposes.

The remains of prehistoric Native Americans have been found in the planning area, and more will probably be found. When such remains are found, BLM contacts representatives of appropriate Native American groups and arranges for treatment or repatriation according to criteria specified by the Native American Graves Protection and Repatriation Act and the Archaeological Resources Protection Act.

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LAND USES

LANDS AND REALTY ACTIONS

Rights-of-Way

The Empire-Cienega Planning Area has about 40 recorded easements and rights-of-way for roads, utilities, and other land uses. BLM acquired and reserved these easements and rights-of-way with its acquisition of the Empire-Cienega property on June 8, 1988. More recent roads and utility lines have been developed to service structures and facilities but are not recognized as rights-of-way because they benefit BLM and its lessees.

Major Utility Lines

Electrical transmission and communication rights-of-ways cross public lands in the following areas:

T.18 S., R. 17 E., sec. 12; Tucson Electric Power Co.

T.18 S., R.18 S., sec. 7 and 19;Arizona Electric Power Co.

T. 19 S., R. 18 S., sec 5 and 9.Tucson Electric & Arizona Electric

The right-of-way widths for these easements are about 100 feet each. Neither electric company has any immediate plans or proposals to install new or more electrical lines.

A privately owned El Paso gas line easement runs through federal lands in the following areas:

T. 19 S., R. 17 E., sec 7, 18, 19, 30
T. 19 S., R. 16 E., sec. 25.

Owned by the El Paso Natural Gas Co. and conveyed to El Paso before BLM acquired the Empire-Cienega property, this private easement is 60 feet wide. El Paso Natural Gas has no plans to install any other new lines within its private easement. Should a new gas line be needed in the future, El Paso will have to cross BLM lands next to its easement to install, maintain, and access the new line.

No other major utility lines run through any federal lands at the north end of Empirita or near Interstate 10. But throughout the planning area are scattered smaller utility lines that BLM and prior owners installed and granted.

Land Use Permits

In the past BLM has authorized land use permits in the planning area for uses such as major motion pictures, television commercials and productions, bee hives, and still photography. BLM rarely issues these authorizations, at most issuing one permit every 2 years.

Land Tenure

The Land Tenure Amendment to the Safford District Resource Management Plan (RMP) (BLM 1994b) made land tenure decisions for the Empire-Cienega Planning Area while the planning area was administered by the BLM Safford District. The Empire-Cienega Long Term Management Area (LTMA) was one of 24 LTMAs delineated in the Land Tenure Plan Amendment. These LTMAs are analogous to the resource conservation areas (RCAs) established in the Phoenix RMP. The boundaries of the Empire-Cienega LTMA correspond to the current planning area boundary. Management prescriptions for the LTMAs include the following:

- Intensively manage the public lands for their multiple resource values as defined in the Federal Land Policy and Management Act.

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- Retain all public land (surface and subsurface estate) and possibly seek to acquire State Trust and private lands within these areas.

- Consider land acquisitions on a case-by-case basis and consider economic as well as natural resource impacts.

Under these prescriptions, BLM may acquire land by exchange or purchase, considering four alternatives for private lands acquisitions:

- Land owner education.

- Entering into cooperative management agreements.

- Partial acquisition such as conservation easements.

- Full "fee simple title" acquisition.

The purpose of the acquisition program is to acquire lands that can improve the area's resource management and values and enhance the benefits of public use and services. Ongoing land exchanges that would acquire more public lands within the planning area include the Morenci Land Exchange EIS (ROD, March 1997) and the Dos Pobres/San Juan Project EIS (volume 2, appendix BB-B9).

PRIME AND UNIQUE FARM LANDS

Public Law 97-098, the Farmland Protection Policy Act of 1981, authorizes the designating of prime and unique farm lands. BLM has not designated prime or unique farm lands in the planning area. Before BLM acquired the property, land on the Cienega Ranch along Cienega Creek was briefly farmed to maintain agricultural water rights. These agricultural fields have been abandoned.

FLOODPLAIN DESIGNATION

Lands within the planning area might meet the criteria for Pima and Santa Cruz County floodplain and flood prone designations for lands, but these areas have not been delineated. BLM generally avoids floodplains as locations for structures and recreation facilities. Some range improvements, including fences and livestock watering facilities, have been built on floodplains and require regular maintenance.

MINING

Mineral Potential

Fluid Minerals

The Empire-Cienega Planning Area is ranked prospectively valuable for oil and gas (Stipp and Dockter 1987). Most of the planning area is underlain by a thick and structurally complex sequence of Mesozoic and Paleozoic sedimentary rocks overlain by Tertiary valley-fill alluvium. The Cretaceous Bisbee Group immediately underlies the Tertiary alluvium and contains black shale, which may have hydrocarbon source rock potential. An oil seep is reported to occur in T. 18 S., R. 18 E., SW¼ section 15 within the Bisbee Group, where it crops out along the eastern margin of the Cienega Basin (Gill 1979). Oil and gas shows have been reported in exploratory wells drilled on the edge of the basin.

The Ted Jones No. 1 Juanita State drilled in section 34, T. 18 S., R 18 E. found several gas shows in shale in Bisbee Group strata. Source rock analysis conducted by the Amoco Production Company concluded that samples from this well have high enough organic carbon content to make a good source rock for gas (Arizona Geological Survey file data.) The Jones *et al.* Larimore No. 1, drilled near Sonoita (section 9, T. 20 S., R. 16

E.), found oil and gas shows in Cretaceous rocks at a depth of 3,216 feet (Arizona Geological Survey file data). These lines of evidence suggest that the Cienega Basin is a favorable environment for oil and gas.

The planning area is not prospectively valuable for geothermal resources (Witcher and others 1982.)

Solid Leasable Minerals

Solid leasable minerals (coal, oil shale, tar sands, potash, phosphate, sodium) are not present or potentially present within the planning area, and there is no record or expression of interest in this resource.

Locatable Minerals

The Empire mining district lies within the Empire Mountains and consists of carbonate replacement deposits and veins associated with Laramide porphyry dikes. Mineralization is spotty, and the deposits are small tonnage and high grade, with rich silver ore having been mined near the surface (Keith 1974). Production was from the enriched oxidized portion of the deposits, which are most probably mined out now. Some of the deposits may extend down to the water table and contain zones of sulfide mineralization. Exploration has not been conducted deep enough to test this hypothesis.

Minerals were discovered in the 1870s, and considerable silver was mined in the 1880s and 1890s. Base metals were produced from 1907 to 1964. Total production from the district was 34,500 tons of ore containing lead, zinc, copper, silver, gold, molybdenum, and tungsten. The major producing mine of the district was the Total Wreck Mine, which produced 14,000 tons of ore averaging 8% lead, 7 oz/ton silver, and minor copper and gold. The chief ore minerals were cerussite, wulfenite, and cerargyrite.

From the above information, the Empire Mountains appear to have low potential for significant metallic mineral resources. Deposits may be hidden inside the mountains, but these are most likely to be subeconomic.

High-purity limestone deposits are known to occur in the Paleozoic carbonate strata. The Escabrosa Limestone is particularly favorable for high-purity limestone deposits. This formation crops out sporadically in the Empire Mountains in small fault blocks. Limestone has been quarried from State Trust Land on the north side of the Empire Mountains just outside the planning area. Limestone placer claims owned by the Georgia Marble Company occur in section 7, T. 18 S., R 17 E. These claims encompass a subeconomic deposit consisting of a relatively thin bed of marbleized Escabrosa Limestone (Acker 1998). Nevertheless, the Empire Mountains have high potential for high-purity limestone.

Directly west of the planning area is the Greaterville gold placer district. Placer gold was mined from Quatemary gravels in the bottoms of major canyons that dissect the valley-fill alluvium on the east side of the Santa Rita Mountains. The gold-bearing gravels begin near the heads of the east-trending canyons and extend 1.5 to 5 miles downstream but do not appear to extend into the planning area (Cox 1994). The potential for placer gold occurring within the planning area is low.

The most significant metallic mineral resource in southern Arizona is copper. Porphyry copper deposits occur in the Helvetia-Rosemont district in the northern Santa Rita Mountains directly west of the Empire Mountains and in the southern end of the Whetstone Mountains east of the planning area. These deposits form in hydrothermal systems related to emplacement of plutons of granitic porphyry rock. The mineral potential of the Cienega basin remains largely unknown because of the thick covering of alluvium. From a regional standpoint, the basin must be considered as having moderate potential for copper because of the favorable geologic environment and presence of nearby deposits.

Salable Minerals
Sand and gravel and landscape rock are the two major salable mineral commodities that are sold within the Tucson and Sierra Vista market areas. Economic deposits of this type have not been found within the planning area. But the potential for sand and gravel deposits is high within the drainages and the alluvial valley-fill. No interest in mining sand and gravel has been demonstrated since the planning area became public land although several Arizona Department of Transportation aggregate sources lie along Highways 83 and 82. Distance to major market areas could prohibit developing a mineral material site.

Mineral Rights

Except for an area in the Empire Mountains and several split-estate parcels, the Empire-Cienega Planning Area is closed to mineral entry and mineral leasing pending a formal opening order (Map 3-7). Lands open to mineral entry total about 460 acres in sections 7, 8, 17, and 18 of T. 18 S., R. 17 E and about 5,915 acres of split-estate. These parcels are original public domain lands. The legal descriptions of the split-estate parcels with either state or private surface and federal minerals are in Appendix 3, Split-Estate Parcels. As of May 19, 1998, there were three placer claims in section 7. BLM has issued no mineral leases within the planning area.

BLM manages locatable minerals under the 43 CFR 3809 Surface Management Regulations, oil and gas under the 43 CFR 3100 regulations, and mineral materials under the 43 CFR 3600 regulations. The planning area is closed to mineral material disposal pending resource management plan determinations.

HAZARDOUS MATERIALS

No recognized environmental conditions are known to exist within the planning area. A *recognized environmental condition* is defined as the presence or likely presence of any hazardous substance or petroleum product on the property under conditions that indicate an existing release, a past release, or a material threat of a release into the ground, groundwater, or surface water. An abandoned 1,000-gallon underground fuel storage tank was removed from the Empire Ranch in 1994 to avoid possible contamination.

RANCHING AND LIVESTOCK GRAZING

As a result of the 1988 land exchange that brought the Empire-Cienega lands into public ownership, BLM acquired private lands in portions of five ranches with ongoing livestock operations: the Empire Ranch, the Cienega Ranch, the Rose Tree Ranch, the Empirita Ranch, and the Vera Earl Ranch. In addition to these private lands, BLM also acquired the Arizona State Land Department grazing leases for the Empire, Cienega, and Empirita ranches. After BLM's acquisition of the private lands, the Empire and Cienega ranches were combined into one grazing allotment, the Empire-Cienega. The acquired public lands in these four allotments were not covered under an existing land use plan, and therefore grazing management allocations and prescriptions are being developed for them in this plan (Map 3-8).

The Rain Valley allotment is also within the planning area boundary. The Rain Valley

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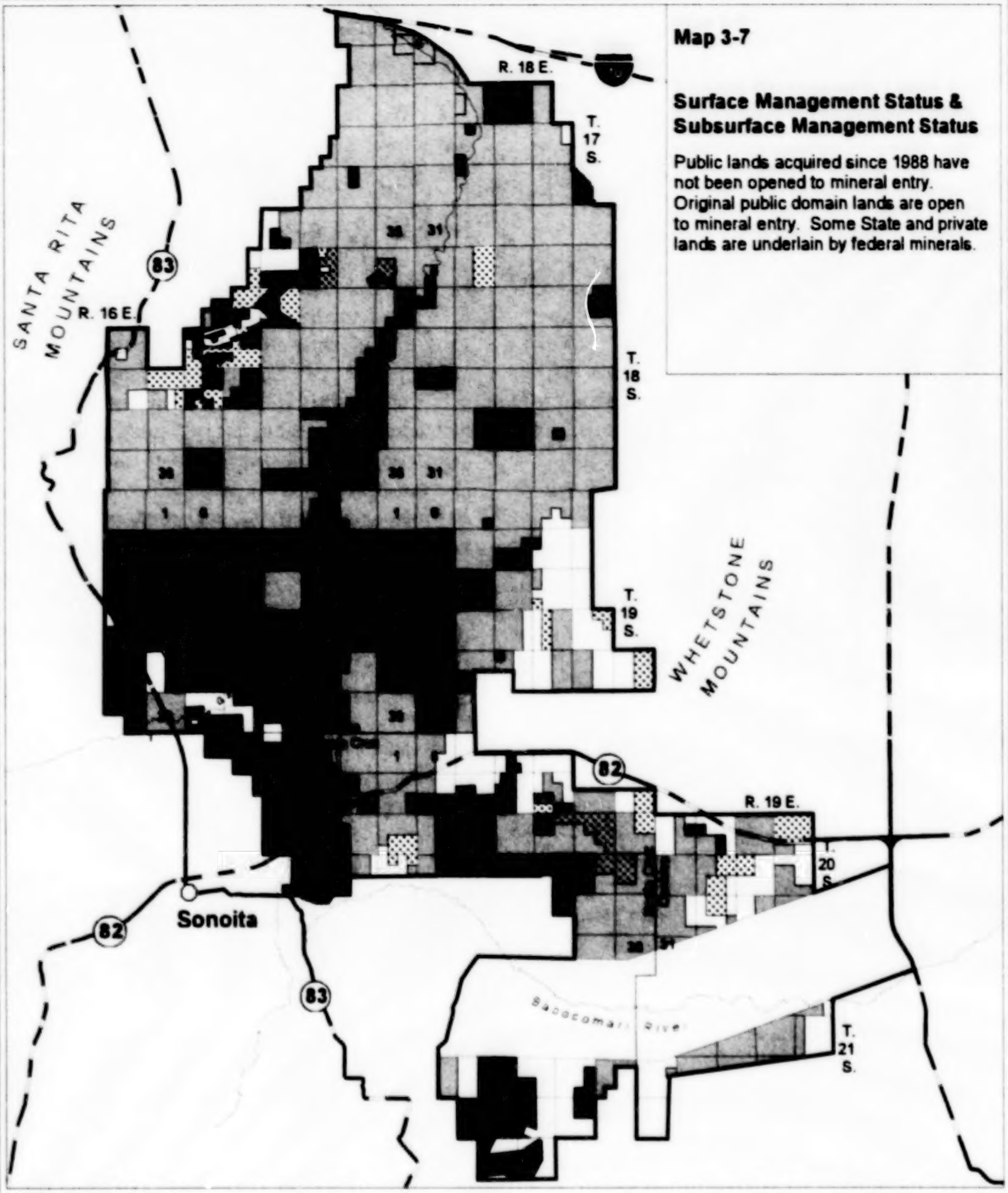

Map 3-7

Surface Management Status & Subsurface Management Status

Public lands acquired since 1988 have not been opened to mineral entry. Original public domain lands are open to mineral entry. Some State and private lands are underlain by federal minerals.

DRAFT
LAS CIENEGAS
RESOURCE MANAGEMENT PLAN

2 0 2 4 Miles

N

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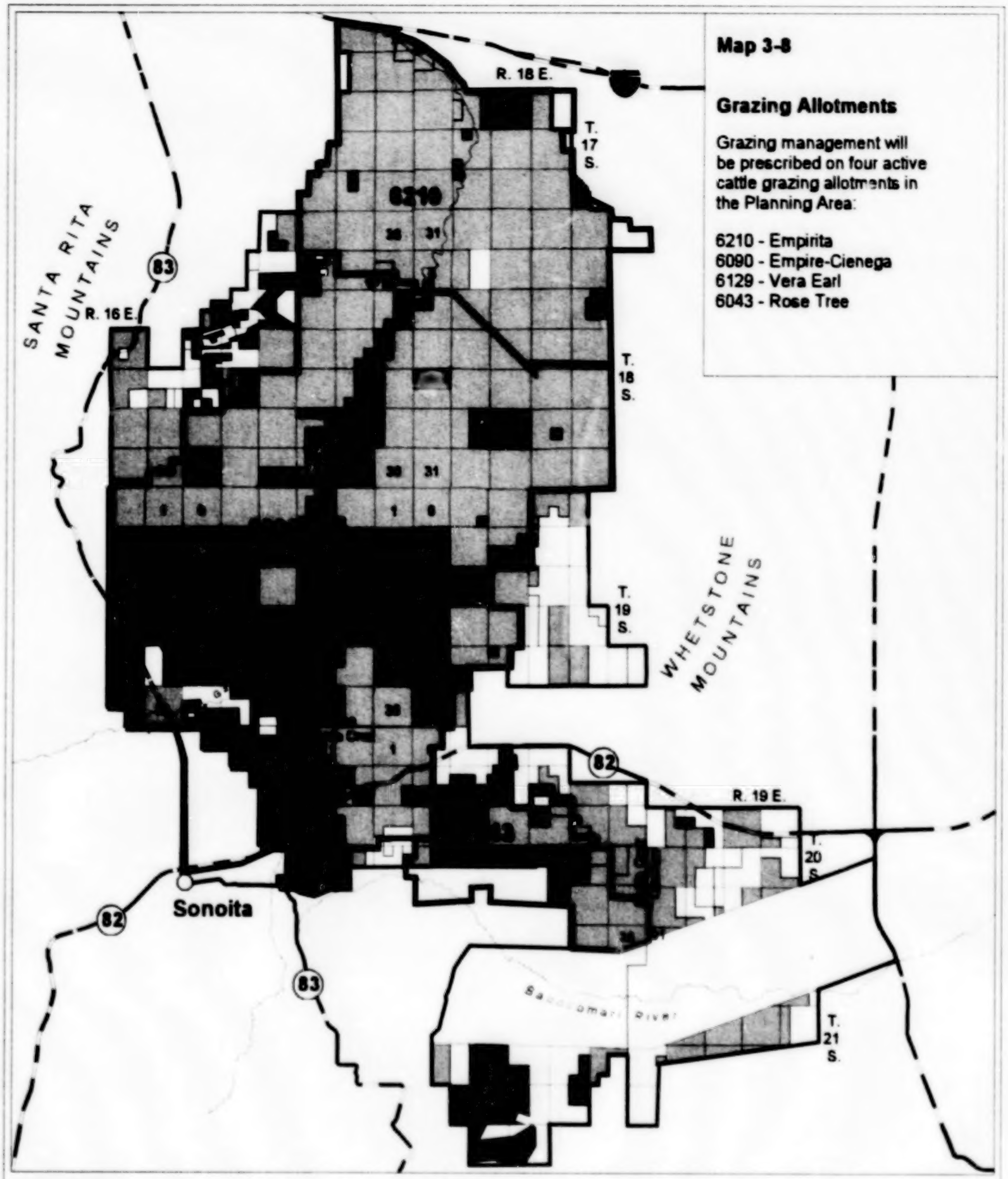
TUCSON FIELD OFFICE

LEGEND
— Planning Area Boundary
■ BLM Land
▒ State Land
□ Private Land
▥ Federal Minerals, Not Open to Entry
░ Federal Minerals, Open to Entry

May 2001



Map 3-8

Grazing Allotments

Grazing management will be prescribed on four active cattle grazing allotments in the Planning Area:

6210 - Empirita
6090 - Empire-Cienega
6129 - Vera Earl
6043 - Rose Tree

DRAFT
LAS CIENEGAS
RESOURCE MANAGEMENT PLAN

2 0 2 4 Miles

N

United States Department of the Interior
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TUCSON FIELD OFFICE

LEGEND

— Planning Area Boundary
■ BLM Land
▨ State Land
☐ Private Land
— Allotment Boundary and Number

May 2001

allotment includes 160 acres of public domain lands but is mostly private and State Trust Land.

The Rain Valley allotment is covered under the Safford District Resource Management Plan (BLM 1991), and grazing impacts for the allotment were analyzed in the Eastern Arizona Grazing EIS (BLM 1986). Therefore, management prescriptions for this allotment are not included in this plan.

In 1988 BLM also acquired in the Empire Mountains 2,000 acres of private lands that did not have valid existing grazing leases at the time of transfer. Since acquiring these lands, BLM has been approached by people wanting to establish a new grazing allotment in the Empire Mountains. The proposed allotment includes acquired lands, original public domain lands, and private lands.

Most livestock operations in the Sonoita area are year-long operations, raising calves from a base herd of cattle for marketing. The ranches usually consist of a mixed ownership of private, State Trust, national forest, and BLM-administered lands. Although the operations are yearlong, they may only seasonally use the federal rangelands.

Table 3-20 summarizes the acreages and permitted grazing use on the four allotments with acquired public lands. The Empire-Cienega and the Empirita allotments consist entirely of federal and state-leased lands. (The operators own no deeded lands in these allotments.) The operators in the Vera Earl and Rose Tree allotments own private lands in their allotments and use these private lands in common with the leased grazing lands. On the four allotments BLM permits a total grazing use of 9,984 animal unit months (AUMs) of forage, which equates to 832 cattle on a yearlong basis (CYLs).

Only the Empire-Cienega and Empirita allotments have grazing management plans. BLM and NRCS completed an ecological site inventory for the Empire-Cienega allotment in 1995, and BLM and the livestock operators developed an interim grazing plan in 1995 (BLM 1995). (See Appendix 2, Summary of Empire-Cienega Interim Grazing Plan.) The Parsons Company Inc., the Natural Resources Conservation Service, the Arizona State Land Department, and BLM cooperatively developed a grazing management plan for the Empirita Ranch in 1994 (NRCS 1994) and completed an ecological site inventory of the rangelands (Appendix 3, Ecological Site Inventories). Both of these plans did the following:

- Prescribed how the livestock grazing operation would be conducted to sustain the resources.
- Established permanent vegetation monitoring sites.
- Determined needed range improvements.

BLM completed a biological evaluation of the Empire-Cienega interim grazing plan, consulted with the U.S. Fish and Wildlife Service (USFWS) under Section 7 of the Endangered Species Act, and received a biological opinion from USFWS (No. 2-21-95-F-177). BLM is now implementing the actions in the biological opinion (Appendix 2, Summary of Biological Opinions). Before this consultation, BLM had consulted with USFWS (1990) on the first riparian fences built along Cienega Creek and received a biological opinion (No. 2-21-90-I-150). USFWS also issued another biological opinion (No. 2-21-96-F-160) as a result of the Section 7 consultation on the livestock grazing program administered by BLM's Tucson Field Office under the Safford District Resource Management Plan. This RMP consultation covered the four allotments with acquired lands as well as the Rain Valley allotment. (See Appendix 2, Summary of Biological Opinions.)

Table 3-20. Grazing Allotments, Empire-Cienega Integrated Management Plan

Allotment	Total Acres	Total Acres Grazed	Total Cows	BLM Acres Grazed[1]	BLM Cows	ASLD[3] Acres	ASLD Cows	Private Acres	Private Cows
Empire-Cienega (6090)	74,146	73,696	1,500	36,025 (659 not grazed)[2]	704	37,462	796	0	0
Empirita (6210)	24,988	23,908	337	440 (1,080 not allocated)	9	23,468	328	0	0
Rose Tree (6043)	8,869	8,869	200	3,950	92	3,719	24	1,200	84
Vera Earl (6129)	1,440	1,440	27	1,440	27	0	0	na	na
TOTAL	**109,443**	**107,913**	**2,064**	**41,855**	**832**	**64,649**	**1,148**	**1,200**	**84**

[1] An additional 160 acres of public land are grazed on the Rain Valley allotment.

[2] The planning area has 7,360 acres of ungrazed public lands, 659 acres of which are within livestock exclosures on the Empire-Cienega allotment and 1,080 acres of which are not allocated to grazing within the Empirita allotment. In addition, 2,480 acres of acquired and original public domain land in the Empire Mountains are not allocated to grazing, and 3,141 acres of public land in the Appleton-Whittell ACEC are closed to grazing.

[3] Arizona State Land Department.

OUTDOOR RECREATION

Southern Arizona is heavily marketed by the tourism industry, especially for recreation involving open space, natural areas, and old west themes. The proximity of the planning area to Tucson and smaller surrounding communities attracts many visitors traveling among several southeast Arizona tourist attractions.

The planning area provides a setting for a wide variety of recreation, mostly for dispersed activities. But the historic ranch is a focal point for many visitors. Activities vary from driving off-highway vehicles to camping, bird watching, studying nature and history, hang gliding, picnicking, horseback riding, hunting, and training bird dogs. Not all of these activities require developed facilities, but visitors often use the grazing permittee's improvements such as corrals and water sources.

Areas of concentrated use include Oak Tree Canyon, the old Agricultural Fields near the Cienega Ranch, the Maternity Well Site, and the old Air Strip. Although the planning area offers high-quality experiences for most recreation activities, the quality of experiences and resources can be diminished by high numbers of visitors during hunting seasons and by those who do not use minimum impact camping techniques.

Generally, visitors drive on existing roads and camp in dispersed areas. Brochures and entrance signs encourage visitors to camp at existing primitive campsites and not to create new campsites or roads. But visitors create many illegal wildcat roads and primitive campsites

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every year. Most visitors camp or park in undeveloped or nondesignated areas at sites developed by social camping (where campers use a site because they see evidence of prior camping). Many of these campsites have degraded surrounding areas. The total disturbed surface in the planning area from campsites is estimated to be 10 acres. An estimated 100-150 social campsites and fire rings dot the planning area.

Oak Tree Canyon seems especially affected because of its desired attributes such as its many Emory oaks, its cooler climate, and its easy access by two-wheel drive vehicle. Visitors often establish their campsites and fire rings directly under the oaks. As a result, extreme campfire heat reaches into the branches, and vehicles compact the soil so that little rain water can seep to the roots.

The planning area's two developed campsites have fire grills, tables, or both. One site is at Empire Gulch, 1 mile north of headquarters. This site may have been intended for picnicking or day use, but visitors often use it for camping, and human waste is contaminating the gulch. The other site is under some old cottonwood trees just southeast of the Agricultural Fields, accessed near North Canyon. Because branches from these decadent trees weigh several hundreds to thousands of pounds and can easily drop off, they are a hazard to anyone camping beneath them.

Unofficially, one can obtain non-potable water at areas such as the Empire Ranch headquarters, Maternity Well, the well between Empire Gulch and the abandoned airstrip, and stock tanks. Often the public will ask the grazing permittee for permission to use these wells and tanks. BLM asks special recreation permit holders to haul in their own drinking water from outside the planning area.

Throughout the planning area are popular hunting campsites, which remain in traditional use. Most hunters seek deer, javelina, coyote, and small game such as rabbit and quail. The Arizona Game and Fish Department issues a few pronghorn hunting permits each year.

The planning area has become increasingly popular for commercial recreation and organized events that require special recreation permits. In the past 10 years BLM has issued permits for hiking, bicycling, equestrian outfitters, orienteering, and competitive bird dog events. Other activities that are known to be occurring but for which BLM has not issued special recreation permits include bird watching tours, stargazing, hang gliding, para-gliding, ultra light flying, paint-ball battles, and family reunions. Most of these activities are based at three sites: Maternity Well (50%), the abandoned Agricultural Fields (30%), and the antelope release site (10%). The remaining 10% of use occurs at other sites.

Table 3-21 presents the percentages of visitors engaged in a variety of recreation activities in the planning area between 1993 and 1998. These percentages are calculated from sign-in register sheets collected at the entrance off Highway 82 and at the kiosk on the main road 1 mile east of Highway 83. Because not every visitor signs in, these numbers do not represent a concise or accurate account of recreation use but rather a sampling. The activities in the "Other" category in Table 3-21 include hang gliding, para-gliding, and horseback riding.

PUBLIC EDUCATION AND INTERPRETATION

General information on the planning area may be obtained from BLM. Some information is also presented in cooperatively funded maps and brochures. Supplies of brochures at visitor

Table 3-21. Recreation Visitors to the Empire-Cienega Planning Area, 1993-1998

	% of Visitor Days Engaged in Activity by Season				
Activity	Winter	Spring	Summer	Fall	Overall
Backcountry Touring and Sightseeing	34.9	38.8	19.7	32.9	32.5
Picnicking	8.7	9.0	17.7	5.0	9.8
Camping Near Vehicle	3.0	9.8	3.4	11.9	7.7
Camping Away from Vehicle	5.0	0.3	0.1	0.2	1.1
4-Wheel/All-Terrain Vehicles	2.7	2.1	2.8	3.2	2.7
Motorcycling	0.7	1.1	1.8	1.1	1.2
Bicycling	3.2	2.4	1.3	3.9	2.7
Hunting	2.9	2.1	10.1	11.7	6.5
Watching Wildlife	13.5	14.9	11.1	12.8	13.2
Hiking	2.9	3.0	5.4	1.5	3.1
Viewing Cultural Sites	0.7	--	1.1	0.3	0.4
Field Dog Activities	1.5	0.8	1.1	0.7	0.9
Other	20.3	15.7	24.4	14.8	18.2
TOTAL	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
TOTAL Visitor Days	**1,203**	**2,256**	**1,461**	**1,707**	**6,627**

centers vary throughout the year. The current trend is to scan all brochures and maps onto computers, allowing information printed from computer web sites to replace traditional printed material. The public is increasingly accessing these sites. The public may also obtain off-highway vehicle maps and general guides by mail or pick up copies at the BLM office. Brochures or maps are occasionally available at the historic Vail ranch house or given out by volunteers. The main information source for most planning area visitors consists of displays on bulletin boards at the main entrances from Highways 83 and 82.

The public generates significant amounts of information on the planning area through internet sites, guide books, and other publications. We do not know the exact amount, accuracy, or contents and whether this information supports management objectives.

BLM presents informal and formal interpretive/educational programs 1 to 10 times a year for schools, universities, and professional and other groups. But BLM receives an average of up to 20 requests a year for formal presentations by resource specialists. Often the

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requesting parties are professional organizations conducting seminars, field trips, or large conferences. Many informal requests for presentations do not give much notice, and BLM specialists may deliver formal or informal presentations depending on the time they have for preparation.

One way that BLM is dealing with increasing requests for tours by experts is referring them to the outfitters with permits to operate in the planning area. But outfitters often ask BLM staff to participate because they do not feel qualified to talk to the public about the area.

ACCESS AND OFF-HIGHWAY VEHICLE MANAGEMENT

The planning area's most used and publicized access point is the Empire Ranch Road off of Highway 83, near mile marker 40. The second most used access is South Road from Highway 82, 4 miles east of Sonoita. In addition, the U.S. Forest Service has developed an off-highway vehicle (OHV) staging area at Highway 83 and Oak Tree Canyon. This staging area allows access between Forest Service, State Trust Land, and BLM-managed areas for hikers, horseback riders, all-terrain vehicles, and motorcycles only. The culvert and barricades under the highway exclude cars and trucks. This access is published in OHV maps and guides distributed by Arizona State Parks.

The public uses many other access points to enter public lands in the planning area. These access points appear on a wide range of maps. BLM has not secured legal access for any of the other access points that cross private or State Trust Lands. These access points, therefore, may not be open to the public over the long term.

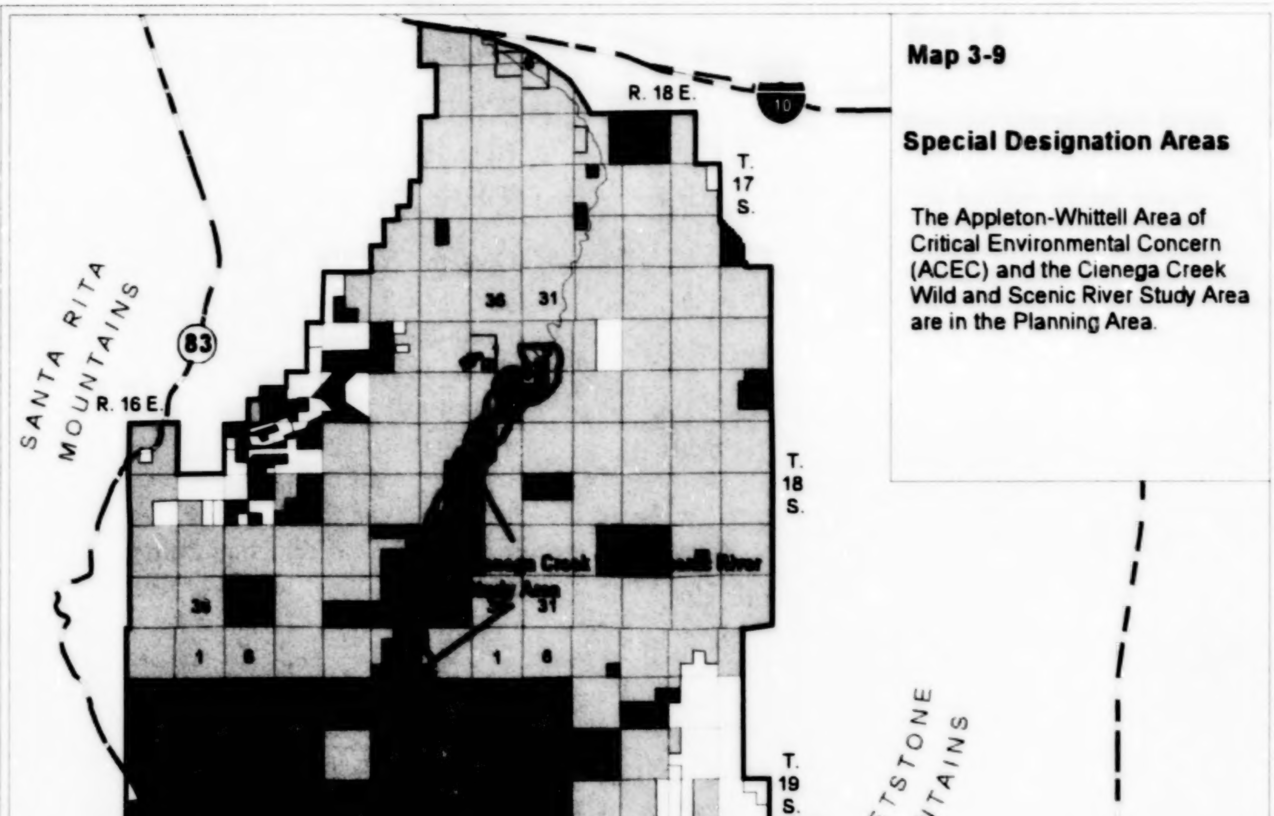
Under interim management guidance for the public lands in the planning area, motorized vehicles are limited to designated roads and trails (BLM 1988). Although most existing roads have remained open to public use, some roads have been closed or restricted for resource or safety reasons. The designated road system was partially implemented in 1999 through publication of the Empire-Cienega Access Guide map and implementation of an associated road numbering system.

SPECIAL DESIGNATION AREAS

WILD AND SCENIC RIVERS

BLM has determined that two segments of Cienega Creek within the planning area are eligible for further study in the Wild and Scenic River evaluation process because Cienega Creek is free flowing and has outstandingly remarkable essential habitat for the federally endangered Gila topminnow (Safford District Resource Management Plan Amendment)(BLM 1993). The Final Arizona Statewide Wild and Scenic Rivers Study Report/Record of Decision (February 1997) determined that the two segments of Cienega Creek were suitable to be recommended to Congress for inclusion in the National Wild and Scenic Rivers System. Both river segments have been tentatively classified as scenic.

The Cienega Creek Wild and Scenic River Study Area contains 10.5 river miles, of which 10 are managed by BLM and 0.5 miles crosses State Trust Land (Map 3-9). The study area extends out 0.25 miles from the mean annual high water mark shoreline on either side of Cienega Creek. The 3,360-acre study area includes 3,200 acres of BLM-administered land and 160 acres of State Trust Land. The 10.5 miles of river in the study area include two separated segments of Cienega



Map 3-9

Special Designation Areas

The Appleton-Whittell Area of Critical Environmental Concern (ACEC) and the Cienega Creek Wild and Scenic River Study Area are in the Planning Area.

DRAFT
LAS CIENEGAS
RESOURCE MANAGEMENT PLAN

2 0 2 4 Miles

N

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TUCSON FIELD OFFICE

LEGEND
— Planning Area Boundary
■ BLM Land
▨ State Land
☐ Private Land
☐ Wild & Scenic River Study Area
▨ ACEC

May 2001

Creek totaling 8.5 miles and 1-mile segments each of Mattie Canyon and Empire Gulch–tributaries to Cienega Creek.

AREAS OF CRITICAL ENVIRONMENTAL CONCERN

BLM has designated one area of critical environmental concern (ACEC) within the planning area. The Appleton-Whittell ACEC includes 3,141 acres of public land. It is managed under a cooperative management agreement with the National Audubon Society (signed in 1986) as part of the Appleton-Whittell Biological Research Sanctuary (Research Ranch) (Map 3-9). The objectives for the area include the continuation of ongoing research, encouragement of future research, and protection of the land and its ecological communities from disturbance. The ACEC provides a unique outdoor laboratory for studying the effects of nongrazing on a desert grassland and ecological relationships within a nongrazed grassland. Within the ACEC, BLM has done the following:

- Limited motorized vehicles to designated roads and trails.
- Prohibited land use actions except as authorized by the Research Ranch.
- Kept the area closed to mineral location, leasing, and sales.

SOCIAL AND ECONOMIC CONCERNS

The Empire-Cienega Planning Area is surrounded by three counties and several communities. Social and economic issues brought forth during scoping include the following:

- How do our actions reflect on economics of the region, both private and public?
- Growth.
- Attitudes (expectations, balance, respect, communication, rural versus urban, education).

The planning area itself is large. Although its lands are in Pima and Santa Cruz counties, its management may affect communities in other counties.

QUALITY/WAY OF LIFE

Residents of Sonoita have expressed a desire to maintain their quality of life–their current rural lifestyle. But the quality-of-life issue is highly subjective. Quality-of-life issues involved the following growth concerns:

- Impacts of future traffic between Sonoita and Tucson.
- Possible increase in commuters and the concern that growth would bring internal and external impacts upon public/forest/private lands.
- How these impacts would affect the area's rural lifestyle.

POPULATION AND DEMOGRAPHICS

Communities near the planning area are in three counties: Vail in Pima County, Patagonia and Elgin in Santa Cruz County, and Benson in Cochise County. These communities range from 8 to 20 miles from the planning area. The closest communities are Sonoita, Elgin, Patagonia, and Vail. The largest nearby community is Benson.

These communities vary in population from 417 in Elgin to more than 6,000 in Benson. While Benson's population is 61% urban, the other communities are mostly rural (Bureau of the Census 1996).

Projections for the year 2000 estimate a 10.7% population increase for Cochise County. Santa Cruz County is projected to increase by 16.2%, and Pima County will have the largest increase in population–18% (ADES 1998).

As a percentage of the communities' county population, Hispanics comprise the single largest ethnic minority group. The largest populations are in Vail with 26.9% and Patagonia with 35.8%. Native Americans and other minority groups make up less than 5% of the population in all of the communities (Bureau of the Census 1996).

Out of the 15 counties in Arizona, Santa Cruz is ranked fifth in the state in the number of people in poverty. Cochise is ranked eighth and Pima eleventh (Bureau of Census 1993a).

LOCAL AND REGIONAL ECONOMY

The main economic activities in Santa Cruz County are concentrated in Nogales, 18 miles south of Patagonia (Arizona Department of Commerce 1993). All of Santa Cruz County is an Enterprise Zone. An Enterprise Zone is a Presidential Empowerment Initiative that seeks to empower communities by supporting local plans that coordinate economic, physical, environmental, community, and human development. The county's main industries include tourism, international trade, manufacturing, and services. Patagonia is the second largest community in Santa Cruz County, but its population is only 1,664 whereas Nogales has nearly 8,000 residents.

Pima County is the second largest Arizona county in population and area. Major county industries include copper mining, manufacturing, tourism, and education. Vail is predominately rural. Its residents are either self-employed or employed by local, state, or federal governments (Arizona Department of Commerce 1994).

Farming, ranching, tourism, and the military are the major industries in Cochise County. Sierra Vista is the county's largest city. Benson, the second largest city, lies along several trade routes: Interstate Highway 10, U.S. Highway 90, and the main line of the Southern Pacific Railroad. Nearby mining and manufacturing are the area's major employers.

EMPLOYMENT

The statewide unemployment rate in Arizona is 4.7%. Countywide unemployment varies greatly. Pima County has the lowest unemployment rate at 3.4%. Santa Cruz County has the highest unemployment rate at 17.9%. Twenty-two percent of the county's unemployment is in the Nogales area. The unemployment rate in Cochise County is 10.0%. The unemployment rates for both Santa Cruz and Cochise counties exceed the statewide unemployment rate (ADES 1998).

ENVIRONMENTAL JUSTICE

On February 11, 1994, Executive Order 12898 (Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations) was published in the *Federal Register* (59 FR 7629). The order requires federal agencies to recognize and address disproportionately high and adverse human health or environmental effects to its program's policies and activities on minority and low-income populations. The Environmental Protection Agency has defined environmental justice as the fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

BLM has involved the public by inviting it to participate in local scoping meetings at the beginning of the EIS process. Other public meetings of the Sonoita Valley Planning Partnership have invited the public to sit in and contribute their issues and concerns about the planning area as well as actively participate in developing the management plan (see Chapter 5).

CHAPTER 4

ENVIRONMENTAL CONSEQUENCES

The Gray Hawk, one of more than 230 bird species on the National Conservation Area, nests in large cottonwood trees.

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CHAPTER 4
ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

Chapter 4 presents the environmental consequences of the alternatives described in Chapter 2. Table 2-32 presents a comparative summary of these consequences. All environmental consequences from the alternatives are described for each resource topic. Resource topics are presented in the same order as in Chapter 3, the Affected Environment. Alternative 1 (Current Management) is the environmental baseline. Under each resource topic, Chapter 4 first discusses the consequences of no change in current management (Alternative 1) and then describes changes in impacts under Alternatives 2, 3, and 4. Cumulative impacts are addressed at the end of each resource section. The following assumptions are common to all impact analyses:

- BLM would have the funding and work force to implement the selected alternative. (But the alternatives might vary in the funding and staffing needed for implementation.)
- Short-term impacts would occur over a period of 5 years or less.
- Long-term impacts would occur over a period exceeding 5 years.
- Short- and long-term impacts are described for proposed decisions and actions on public lands under each alternative. The exception is for impacts of livestock grazing. Since BLM holds grazing leases on State Trust Lands on two allotments, Chapter 4 also addresses the impacts of livestock grazing on these State Trust Lands.
- BLM would monitor impacts and adjust management as needed in response to new data derived from monitoring.

Assumptions specific to a given resource are provided in that section. Cumulative impacts assumptions are included in Appendix 4.

The following critical resource elements, as set forth in Appendix 5 of the BLM NEPA Handbook (BLM Manual H-1790-1), have been analyzed and are not present or would not be affected by implementing the alternatives: environmental justice, prime and unique farmlands, Native American religious concerns, hazardous or solid wastes, and wilderness.

Environmental Justice - The EIS found that none of the alternatives would have disproportionate adverse human health or environmental effects on minority and low-income populations.

Prime and Unique Farmlands - The planning area has no designated prime and unique farmlands.

Native American Religious Concerns - Consultation with Native American tribes has found no Native American religious concerns within the planning area.

Hazardous or Solid Wastes - No hazardous or solid waste sites or issues have been found within the planning area.

Wilderness - The planning area has no designated wilderness areas and no public lands suitable for wilderness designation.

IMPACT ANALYSIS BY RESOURCE TOPIC AND ALTERNATIVE

PHYSICAL RESOURCES AND PROCESSES

Impacts to Air Quality

The impacts to air quality under any of the alternatives would be minimal. Restricting vehicle use on some roads under Alternatives 2, 3, and 4 would slightly improve air quality in the short term. Prescribed fire as part of integrated vegetation treatment under Alternatives 2, 3, and 4 would degrade air quality over the short term. BLM expects no cumulative impacts on air quality.

Impacts to Water Resources

Impacts to Watershed

Impacts to Watershed from Alternative 1 (Current Management)

Scope of Analysis: Impacts to watershed include effects on watershed resources and processes including soils, groundwater, surface water, and vegetation cover.

From Desired Resource Conditions

Watershed: Upland, Riparian, and Aquatic Vegetation Management

Under current management, soils would remain stable for the short term, but soil erosion would tend to increase over time due to continued livestock grazing, exclusion of wildfire, and lack of integrated vegetation treatment. Desirable perennial grasses would decrease with the increase in brush. The resulting increase in bare ground would allow increased runoff of precipitation and increased sedimentation. With little or no concerted efforts to treat upland vegetation and continued suppression of wildfires, shrubs would continue to invade the uplands at the expense of desirable perennial grasses as a long-term trend. As a result, herbaceous cover on the soil surface would decline with related hydrologic effects, including less infiltration, increased runoff, increased erosion, and increased sedimentation. The planning area might no longer meet Part B of the upland vegetation objective for watershed cover. Over time, increased peak flood flows and sedimentation would likely alter channel maintenance processes and adjust channels (Leopold 1994; Rosgen 1996). Possible undesirable adjustments to Cienega Creek include bank erosion, filling of pools, and the forming of a wider, shallower stream profile. A lack of integrated vegetation management is likely to cause long-term harm that offsets gains from improved livestock management and other watershed uses.

The lands in the Babocomari watershed are likely to undergo similar harm from a lack of integrated vegetation treatment. But the public land acreage in this area is not large, and lack of vegetation treatment would not greatly influence sedimentation and runoff relationships in the Babocomari River.

Fish and Wildlife, and Cultural Resources Management

Current management would not affect watershed condition and function. But the presence of endangered species or cultural resources and required mitigation might constrain and add costs to implementing watershed improvement projects.

Visual Resource Management

Management as VRM Class III might constrain and add costs to implementing projects that benefit watershed conditions.

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From Land Use Allocations

Mineral Development

Mineral development would not disturb watershed conditions in most of the planning area under Alternative 1 because BLM has not opened the lands acquired in1988 to mineral entry (48,542 acres or 33% of the watershed). But 458 acres of BLM surface estate and 5,915 acres of subsurface mineral estate could be mined. Before BLM would authorize a mine that would exceed 5 acres, the mine operator would have to prepare a mining plan of operations with mitigation and site-specific environmental review. Oil and gas development and small-scale (casual use) mining, including the building of access roads and the disturbing of mining sites, are likely to directly harm watershed health. The development of a large-scale mine or the proliferation of small-scale mineral development in the planning area is likely to disrupt hydrologic processes, which influence erosion, deposition, and stream function; reduce ground and surface water quantity; and lower water quality.

Large mines often require an influx of development to support operations. The expansion of residential and commercial areas for large-scale mining is likely to lessen ground water resources. A corresponding increase in the use of the planning area is likely to disturb watersheds by generating wildcat roads, increased number of campsites, localized trampling, and increased incidence of wildfire. The harm could be negligible to severe, depending on the scale, potential for mitigation, and location and type of mine.

Utility Rights-of-Way and Land Use Authorizations

New utility lines could cause short- and long-term harm by disturbing watersheds, mainly from development and service roads. Soil disturbance can be partially mitigated by treatments, including proper engineering of maintenance road drainage and revegetating of disturbance after construction or maintenance. But residual impacts such as service roads are likely to increase runoff, erosion, and sedimentation in the long term as new corridors proliferate.

Lack of designated utility corridors could help proliferate utility lines in the planning area. It is unknown how many lines would be approved or the locations. However, right-of-way construction for doubling the existing lines, as an example, would disturb about 540 acres of watershed in the short term on public lands. More long-term disturbance from associated service roads is also expected.

Off-Highway Vehicle Management

Limiting off-highway vehicle (OHV) travel to designated roads would protect the soil from cross-country vehicle traffic. OHV control would directly benefit watershed condition.

Road Designations

The planning area's 136.4 miles of roads (open and restricted to administrative use) amount to 198 acres of disturbed watershed in the upper Cienega Creek and upper Babocomari River basins. Under Alternative 1 this small acreage of roads on relatively stable upland soils would only slightly harm watershed function and promote sedimentation when properly maintained to BLM standards. But the use of 11 fords that cross Cienega Creek on fragile soils directly promotes erosion and sedimentation. These crossings concentrate recreation and extend the area of soil and vegetation disturbance and therefore disturb watershed function.

Arizona Trail

Under Alternative 1 the Arizona Trail would not cross the planning area and would therefore not affect watershed conditions

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Recreation Management

Alternative 1 would establish no recreation zones. Unrestricted camping, hiking, and hunting would cause some small-scale disturbance to the watershed. Group events would need permits with stipulations that would partially mitigate impacts. Revegetation of sites damaged from heavy use would further mitigate impacts. Few group sites would cause watershed damage, and such sites would be small.

Areas of concentrated recreation use on public lands currently affect about 20 acres with loss of or reduced vegetation cover and compacted soils. Recreation use is light in the riparian area along Cienega Creek and Mattie Canyon but is heavy enough in upper Empire Gulch to cause some trail and light bank damage.

Recreation is growing in the planning area. Under Alternative 1 visitors are likely to camp and create more unauthorized trails in riparian zones. The density of campsites is likely to increase. Bank damage is likely to start erosion on these fragile soils.

Administrative Sites

Designating four administrative sites in areas with existing buildings would continue the more intensive uses at these sites and result in about 105 acres of watershed disturbance.

Livestock Grazing

Empire-Cienega Allotment

Under current livestock grazing management, data show that watersheds on the Empire-Cienega allotment are in satisfactory condition with adequate cover and a stable trend. (See Chapter 3, Affected Environment.)

Nonetheless, watersheds exposed to moderate grazing have decreased infiltration rates, which result in increased runoff from storm events (Gifford and Hawkins 1978). Studies in Dadkhah and Gifford (1980) in the intermountain West found that livestock trampling lowers infiltration rates, but regardless of trampling, sediment yields remain uniform after grass cover reaches 50%. Data from 1991 on the existing watershed condition shows that the current cover averages 57% in the planning area. In desert settings, soil compaction might be offset by invertebrates that aerate and loosen soil (e.g. termites and ants) where plant litter is maintained in sufficient quantities to support large populations of invertebrates (Whitford and others 1995).

In the long term, current grazing management should benefit watershed and condition in many areas. An increase in plant density would do the following:

- Decrease the upland runoff rate.
- Increase retention of precipitation and attenuation of floods.
- Increase moisture infiltration into the upland soils and alluvium in ephemeral channels.
- Ultimately recharge the groundwater.

Intense, short-duration grazing, coupled with the resting of pastures and flexible stocking rates, would likely improve vegetation cover on the watershed. The current grazing strategy provides a large measure of protection to watershed conditions by the following:

- Continuously monitoring pasture productivity and use.
- Implementing suitable stocking rates (0-13 head/section).
- Rotating pastures to minimize the deterioration of plant and litter soil cover types.

The current allowable utilization of 40-60% under the interim grazing plan is higher than that recommended by Holechek and others (1998) to provide sustainable use compatible with maintaining or improving watershed condition. BLM lacks sufficient utilization data to determine if it has achieved this objective on the Empire-Cienega allotment. A lack of vegetation management is likely to result in long-term harm that offset gains made from improved livestock management and other watershed uses. The risk of damaging vegetation during extended drought is likely to be negated by reducing stocking rates and leaving pastures as reserve forage.

Excluding 450 acres from livestock grazing along Cienega Creek, Mattie Canyon, and Empire Gulch prevents disturbance of fragile bank vegetation and soils. Winter only grazing in northern pastures that includes 2 miles of Cienega Creek greatly limits stream bank alteration and sedimentation and benefits soil stability. Livestock using these pastures into April, especially during warm, dry winters, have damaged stream banks. A small negative impact has resulted from a limited amount of bank erosion and sedimentation in some years. Future fencing proposed by the existing interim grazing plan would nearly eliminate the altering of stream banks by livestock.

Over the long term stock tanks are likely to harm watershed function and condition. Use of 30+ earthen stock tanks on the Empire-Cienega allotment could disturb up to 1,800 acres (3 mi^2)(Andrew 1988). But because of the short duration of use, the area disturbed is likely to be less than a third of this amount. The impact would be spread out over the entire allotment. Stock tanks are likely to produce long-term harm to watershed function and condition.

The first phase of building more fencing under Alternative 1 on the Empire-Cienega allotment would not significantly disturb vegetation. The fence lines would not be bladed, and as little brush as possible would be cut. Fencing for crossing lanes would have to be rebuilt periodically when damaged by flooding. Little fencing would be required for crossing lanes (300 feet of fence per crossing), and any rebuilt fencing would be routed to avoid vegetation. Fence lines would not need to be cleared. No vehicles would be used in the riparian areas during construction or repair.

Livestock's intermittent use of six existing crossing lanes when moving to fresh pastures would damage vegetation and stream banks for a short period without long-term disturbance because livestock do not use crossing lanes year round. The rebuilding, repair, and livestock use of crossing lanes are likely to only negligibly degrade watershed and condition.

The grazing strategy is the same on about 37,460 acres of leased State Trust Lands contiguous to BLM-managed public lands. The watershed condition on these lands is likely to have the same level of impacts as BLM-managed lands with the same results to watershed condition. Because BLM would manage such a large portion of the watershed to maintain good watershed cover and healthy vegetation, about 74,150 acres or 51% of the upper Cienega Creek watershed is expected to have satisfactory conditions that limit excessive erosion, stream sedimentation, and flooding while promoting rainfall retention and groundwater recharge.

But in the uplands, grazing (along with other factors), in the absence of vegetation treatments such as prescribed fire, is likely to slowly facilitate the increased proportion of shrubs such as mesquite and burroweed (National Research Council 1994; Bahre 1995). The result would be more exposed soil surface subject to increased rates of erosion.

Empirita, Rose Tree and Vera Earl Allotments

For the Rose Tree, Vera Earl, and Empirita allotments watershed health has not been determined. Alternative 1 would adjust grazing if needed to meet the upland objective.

The current allowable utilization of 40-60% is higher than that recommended by Holechek and others (1998) to provide sustainable use compatible with maintaining or improving watershed condition. BLM lacks sufficient utilization data to determine if this objective has been achieved on the Empirita, Vera Earl, or Rose Tree allotments.

The risk of damaging vegetation during extended drought is likely to be negated through stocking rate reduction and leaving pastures as reserve forage on the Empirita allotment under the current grazing plan. But on allotments with fixed stocking rates during extended drought this grazing strategy is likely to degrade the watershed if plants lose vigor due to persistently low soil moisture and continued grazing at fixed levels. The result in the short-term would be large reductions in watershed condition and function. Some of these impacts may persist over the long term.

The Safford Field Office drought policy used by the Tucson Field Office allows for heavy use (60%) when plants are water stressed. In addition, the policy restricts the use of current year's grass production to 60%. But this policy does not consider that in a drought there might be little or no production during the current year and the rotation of livestock is using last year's production a second time.

Implementing range developments in the Empirita Grazing Plan under Alternative 1 would result in a minimal reduction in watershed condition. The first phase of building more fencing on the Empirita allotment would not significantly disturb vegetation. The fence lines would not be bladed, and construction would cut as little brush as possible. The impacts would be short term and negligible. The fence would be routed to avoid vegetation. Fence lines would not need to be cleared. No vehicles would be used in the riparian areas during construction.

The first phase of building 7.25 miles of pipeline with water troughs would disturb small tracts of upland vegetation and up to 7.5 acres of soil. Fencing for Nogales and Little Nogales springs and ¼ mile of Cienega Creek at the Narrows would eliminate potential watershed disturbance in the fragile riparian areas where disturbance can accelerate soil erosion. Impacts from range developments on the Rose Tree and Vera Earl allotments would be similar to those described for the Empire-Cienega and Empirita ranches. The exact nature and degree of impacts from these actions would be analyzed in future environmental analysis for specific proposals.

From Special Designations

Areas of Critical Environmental Concern

By not designating ACECs, Alternative 1 might limit the emphasis placed on maintaining the planning area's ecological integrity, which affects watershed function. Lack of ACEC designation might reduce the options for resolving management issues related to mixed ownership patterns in the watershed and indirectly affect relationships such as water runoff rate (flooding), soil erosion rate, and water infiltration rate. These relationships, in turn, affect soil moisture; soil productivity; aquifer recharge; sedimentation of stream channels; and stream channel width, depth, and shape. BLM could not acquire State Trust and private lands through the Land And Water Conservation Fund. Without some of the management changes prescribed under ACEC designation, a variety of activities that disturb vegetation and soils would be more likely to occur on BLM-administered public lands. The lack of designation is likely to indirectly disturb the vegetation cover and plant litter that protect the soil surface from erosion.

Summary - Alternative 1 Impacts on Watershed

Under current management, existing and potential concentrated activities (roads, rights-of-way, administrative sites, recreation sites, and livestock developments) disturb at most 2,660 acres of public lands distributed throughout the planning area, representing only 5.5% of the public lands in the Upper Cienega Creek basin. Dispersed recreation would potentially affect all 49,000 acres of public land in the watershed. Livestock grazing would affect 41,855 acres. About 6,730 acres of public land and federal mineral estate have the potential for being mined.

Under Alternative 1 BLM would adjust grazing if needed to meet the upland vegetation objective. But BLM is likely to meet with limited long-term success without integrated vegetation treatments and, in some cases, changes in the drought policy. Utility rights-of-ways would likely proliferate in the basin as the population continues to grow and new technologies are distributed to rural areas, degrading watershed condition. Mining for locatable and leaseable minerals and mineral material sales could degrade watershed condition over large areas in the Cienega Creek basin and to a lesser extent in the Babocomari basin. The current level of dispersed recreation is resulting in limited watershed disturbance, but if not regulated, recreation would likely increase dramatically with time. Alternative 1 might fail to meet the upland vegetation and riparian objectives in the long term.

Cumulative Impacts - Alternative 1 on Watershed

Under current management the watershed of Cienega Creek would remain stable and functional over the short term. In the short term, current grazing management would continue to maintain and improve watershed condition on 64,649 acres of State Trust Lands in addition to the 41,855 acres of public lands. Impacts of concentrated uses, including roads, utility lines, and range improvements, would occur on both public and State Trust Lands at about the same levels. Over the long term watershed condition would tend to deteriorate. Trees and brush would tend to increase over the perennial grasses in the plant communities. Operating cattle ranches would continue to be subdivided for residential development. Road networks would expand. And drainage patterns would tend to be channelized. The result of this slow unplanned development would be the following:

- Less open space.
- Decreased infiltration of precipitation into the soil profile.
- Increased surface runoff.
- Higher peak flood flows.
- More rapid transport of water through the watershed.
- Less aquifer recharge.
- Briefer surface flows in Cienega Creek.
- Less water held in the watershed.

Recreation uses would continue to expand as urban dwellers seek escape from cities. Land use authorizations would also tend to increase. As people move out to the Sonoita area, the demand for rights-of-way to access private lands would increase, as would the need to bring utilities to new homesites.

Impacts to Watershed from Alternative 2

From Desired Resource Conditions

Watershed: Upland, Riparian, and Aquatic Vegetation Management
The activity plan actions common to Alternatives 2, 3, and 4 would determine the cause of erosion in lower Wood Canyon and take steps to reduce or stop the erosion. These action alternatives would also repair abandoned stream crossings and other disturbed locations on stream banks and terraces along Cienega Creek and its tributaries. This repair would reduce the level of sedimentation entering Cienega Creek and conserve productive soil resources. Roads found to contribute to excess sedimentation would undergo design changes to prevent further erosion.

BLM is working with other land owners in the watershed to promote watershed health, which benefits public lands by reducing excess sedimentation and flooding and retention of rainfall. As a result, infiltration and groundwater recharge would increase on downstream public lands. In the long term watershed management is expected to benefit watershed conditions.

Management actions common to the activity plans for Alternatives 2, 3, and 4 would have a distinct advantage over Alternative 1 in improving watershed condition and meeting the upland and riparian objectives. Vegetation treatments (prescribed fire, fuel wood cutting, and herbicides) on almost 20,000 acres (14% of the watershed) would improve watershed condition over the long term by reducing and slowing the spread of the shrubs in favor of the herbaceous plants. Dense perennial grass cover is important to watershed health and related hydrologic and soil stabilizing processes. The treatments would mitigate the effects of livestock grazing (Alternatives 2 and 3) on ecological sites where livestock promote shrub invasion. Requiring permits for collecting plants would help prevent the unneeded disturbance from over collecting vegetation. The over collecting could harm areas especially sensitive to erosion (e.g. soils in bottom lands).

But prescribed fire might cause localized short-term harm by increasing erosion rates before vegetation soil cover returns. This type of impact would be largely mitigated by the following:

- Controlling fire intensity.
- Controlling the size of burn units.
- Sequencing units burned annually to spread out impacts over large areas and at different times.
- Ensuring adequate rest from grazing after burning.

Individual burn plans for each year would incorporate this mitigation to protect sensitive areas and reduce post-burn erosion. Thus, the spreading out of prescribed fire over space and time would buffer the watershed, especially stream channels, from excess sediment and ash.

Under Alternative 2 BLM would implement an integrated vegetation management treatment strategy to include all the public lands in the planning area. This strategy would also encourage collaboration by adjacent land owners in designing treatments that include suitable State Trust and private lands to create the most logical and economic units possible. The strategy would be to maintain current ecological site inventories, which would determine existing ecological condition. If the current soil and vegetation conditions are not highly similar to desired conditions, BLM would design and implement a vegetation treatment.

This strategy would maintain the desired soil and vegetation conditions on public lands as well as

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suitable State Trust and private lands. This strategy would tend to look at the entire watershed and direct resources from multiple partners to improving conditions where the changes are most needed to improve watershed health and function.

Fish and Wildlife Management
Under Alternative 2 in the long term, habitat improvements would enhance vegetation structure, and increased cover would promote healthy watershed conditions.

Visual Resource Management (VRM)
Visual resource management as VRM Class II under Alternative 2 would place more constraints and potentially more costs to watershed projects than under current management, including vegetation treatment and restoration.

Cultural Resource Management
Under Alternative 2 cultural resource management might slightly harm watershed condition and function. Developing the Empire Ranch headquarters would likely attract increased visitation and general recreation such as camping and hiking. The result would be more vegetation and soil disturbance. Specific site design would reduce erosion and any uncontrolled runoff from the headquarters. Visitors and staff would increase the amount of water used at the headquarters from that under Alternative 1. Public education and interpretative programs on the watershed would increase awareness of the issue and might improve visitor behavior.

From Land Use Allocations

Mineral Development
Under Alternative 2 watershed stability is likely to benefit in the long term from restrictions on mineral development of acquired public lands and the continued closure and withdrawal of 48,542 acres (33% of the watershed) to mineral development. Restricting mineral development would ensure that extensive mining would not compromise watershed integrity through surface disturbance and water quality through inadvertent release of toxic materials (Nelson and others 1991). The administrative and casual use of a limited amount of sand and gravel, boulders, and clay is likely to inflict small to negligible harm on watershed function and condition.

Utility Rights-Of-Way and Land Use Authorizations
Alternative 2 would restrict utility rights-of-ways to two existing corridors, whereas Alternative 1 would allow for corridors to proliferate across the landscape, spreading disturbance and maintenance roads. More utility development on public lands along the El Paso gas line is likely to disturb at most 30 acres of public lands over the short term as underground utilities are installed. Service roads could disturb another acre of public lands in the long term, slightly degrading watershed condition.

Designating a second utility corridor across 3 miles of public lands with existing overhead utility lines would disturb at most 240 acres in the short term. In the long term disturbance from service roads would amount to about 1 acre of public lands. In the short term, placing utility lines to capacity in the two corridors and allowing utility lines to cross other jurisdictions in the same capacity would disturb at most 270 acres of public land and 1,280 acres total in the watershed (0.8 % of the watershed).

New and existing service roads in the long term would disturb 2 acres of public lands and 45 acres of other lands in the watershed. Treatments such as the following could partially mitigate soil disturbance: (1) proper engineering of maintenance road drainage and (2) revegetating disturbance after construction or maintenance. But residual impacts such as service roads are likely to increase runoff, erosion, and sedimentation. This level of

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disturbance is likely only to slightly disrupt watershed conditions in the long term.

Off-Highway Vehicle Management

Impacts under Alternative 2 would be the same as under Alternative 1.

Road Designations

Under Alternative 2 the road network (open, seasonal use, and restricted to administrative use) would total 122 miles and disturb 177 acres of watershed. The presence of 6.6 miles of nonmotorized single track (converted from roads) would disturb 4.8 acres of watershed. Under Alternative 2 BLM would retire and rehabilitate 16 miles or 23.2 acres (12%) of the planning area's 136.4 mile (198-acre) road system. These actions would benefit watershed health by stabilizing road segments threatened by erosion. Many of these segments lie along stream banks and in floodplains along Cienega Creek.

Arizona Trail

Building the Arizona Trail under Alternative 2 would disturb 4 acres of watershed. Associated camping sites and wildcat spur trails would disturb more areas. This disturbance would only slightly harm watershed function when compared to no trail under Alternative 1.

Recreation

Recreation management described for Alternative 2 is likely to benefit watershed in the long term and would help meet the upland vegetation objective. The level of impact from recreation is difficult to estimate. At least a few thousand people use the planning area annually. Establishing recreation zones under Alternative 2 would limit the extent of camping-related soil disturbance on 4,613 acres (3% of the watershed), which will become important in the long term as visitation increases. The remaining 44,387 acres (30% of the watershed) of public land would remain open to dispersed recreation, including camping, hiking, and hunting.

At first, dispersed recreation would only slightly disturb the watershed. But disturbance would likely increase over time as visitation increases into the tens-of-thousands annually. BLM would have to monitor the extent of impacts and consider further restrictions to sustain watershed conditions that will meet the upland objective. Recreation under Alternative 2 would harm watershed conditions slightly to moderately, depending on the level of use.

Several actions under the activity plan would substantially benefit soil stability, which is important to watershed conditions. Restrictions on gold prospecting and on camping and group activities in riparian areas would lessen the potential for bank disturbance and channel degradation. Establishing three group sites, four camp areas, and a at least 11 pullouts would disturb vegetation cover and soil on 37 acres. Foot and vehicle travel to and around these sites would likely disturb more acreage.

Livestock Grazing

Empire-Cienega and Empirita Allotments

On these two allotments, livestock grazing management under Alternative 2 would improve watershed conditions and help meet the upland and riparian objectives better than would Alternative 1. Adaptive management of livestock numbers and rotation systems adjusted for current grass production would likely improve soil cover conditions and stability. A formal interdisciplinary Biological Planning Team, coupled with more intensive monitoring, would allow for improved grazing management over time as described for Alternative 1.

Planning pasture rotations and stocking rates not to exceed an average of 35% utilization (moderate use level) of the current year's production in semidesert grasslands and meeting cover requirements under the upland objective are likely to allow sustainable use compatible with maintaining or improving watershed condition in the short term (Holechek and others 1998).

Vegetation treatments would improve watershed condition over the long term by reducing and slowing the spread of the shrubs in favor of the herbaceous plants, especially perennial grasses. The risk of vegetation damage and watershed degradation during extended drought is likely to be negated by reducing the stocking rate and leaving pastures as reserve forage in response to current range condition and productivity. The grazing strategy would also improve the condition of intermingled State Trust Lands that would be managed with BLM lands as one unit.

The further exclosure of grazing along riparian areas on Cienega Creek and at Nogales and Little Nogales springs, where soils are fragile and stabilized entirely by vegetation, would extend protection of these sensitive areas. Adding an extensive amount of exclosures (2,319 acres under Alternative 2 versus 659 acres under Alternative 1) on the watershed in different range sites would allow for a comparison of conditions, including soil cover and soil stability in relation to grazing management, as recommended by Bock and Bock (1993).

Rose Tree Ranch and Vera Earl Allotments

On these two allotments grazing management under Alternative 2 would eventually improve watershed conditions and help attain the upland and riparian objectives better than would Alternative 1

Obtaining information on ecological site types and condition would allow formulating a stocking rate and rotation system that is adaptive to current watershed conditions and grass production. When coupled with vegetation treatments, the stocking rate and rotation system would likely improve soil cover and stability over the long term.

This strategy should present only a slight risk of watershed degradation during extended drought. Implementing 600 acres of exclosures on the Rose Tree and Vera Earl allotments (none under Alternative 1) in different ecological sites would allow for a comparison of conditions, including soil cover and soil stability, in relation to grazing management, as recommended by Bock and Bock (1993).

Empire Mountains Allotment

The creation of a new allotment in the Empire Mountains could degrade watershed condition. Depending on soil conditions, some level of watershed impairment from even moderate levels of grazing is likely to decrease infiltration and increase runoff (Gifford and Hawkins 1979). On the other hand, the proposed vegetation treatments would likely improve watershed condition over the long term by reducing and slowing the spread of the shrubs in favor of herbaceous plants. Dense perennial grass cover is important to watershed health and related hydrologic and soil-stabilizing processes. The treatments would mitigate the effects of livestock grazing on ecological sites where past livestock grazing has promoted shrub invasion.

Implementing a flexible stocking rate based on the current year's production and rotation of season of use of pastures would prevent over using vegetation during droughts. These measures are thus expected to maintain the improvements in grass composition and density resulting from vegetation treatments. Exclosing 480 acres from livestock grazing in the Empire Mountains allotment in different ecological sites would allow for a comparison of conditions, including soil cover and soil stability, in relation to grazing management, as recommended by Bock and Bock (1993).

Watershed condition might decline on the allotment if adjacent land owners prevent the implementing of vegetation treatments proposed to restore shrublands to grasslands because of "urban interface" issues related to prescribed fire. Grazing this allotment without vegetation treatments would likely increase the rate of shrub invasion and contribute to watershed degradation. The result would be a small to moderate decline in watershed integrity. In this case, the allotment might not meet BLM's Arizona Standards for Rangeland Health and Guidelines for Grazing Administration. This failure could lead to the allotment's eventual discontinuation.

From Special Designations

Areas of Critical Environmental Concern

Designating a 45,859-acre (31% of watershed) ACEC would benefit the planning area by emphasizing the protection of its unique ecology. Protecting watershed function and maintaining good watershed conditions are essential to supporting the area's rare biotic communities (Fleischner 1994) and especially aquatic communities (Amour and others 1991; Meehan 1991). ACEC designation would facilitate the acquiring of more lands or conservation easements, which would allow watershed health to improve over a larger proportion of the planning area. The ACEC designation would likely direct more agency resources to conserving the planning area's watershed.

Summary - Alternative 2 Impacts on Watershed

Under Alternative 2 the watershed of Cienega Creek would remain stable and functional over the short term and possibly the long term. This alternative proposes concentrated activities (roads, rights-of-way, administrative sites, recreation sites, and livestock developments) that could disturb as much as 2,400 acres of public lands distributed throughout the planning area, representing only about 5% of the public lands in the upper Cienega Creek basin. Dispersed recreation impacts would potentially occur on 44,387 acres of public lands. Livestock grazing impacts would occur on 42,155 acres of public lands. Another 6,730 acres with the potential of being mined are proposed for mineral withdrawal under Alternative 2, subject to valid existing rights. The withdrawal would virtually eliminate the risk of impacts from mineral development.

Alternative 2 places more emphasis on maintaining and improving overall watershed health than do Alternatives 1, 3, or 4 because of its emphasis on ecosystem management and collaboration. Improving watershed condition while limiting disturbance, the proposed management for Alternative 2 would include the following provisions:

- Closing selected roads.
- Closing the planning area to mining (except for valid existing claims).
- Allowing flexible livestock stocking rates.
- Establishing exclosures for 15% of rangelands.
- Restricting recreation.
- Designating an extensive ACEC to protect the ecological integrity of the entire planning area.

These provisions would help meet upland vegetation and riparian objectives in the short and long terms in most of the planning area when coupled with the following management actions common to activity plans for Alternatives 2, 3, and 4:

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- Applying vegetation treatments to increase grass and limit shrubs.

- Restricting riparian camping.

- Not allowing sand and gravel sales.

- Coordinating watershed management with other entities.

- Preventing erosion in Wood Canyon.

Applying the proposed grazing systems to State Trust and private lands that are part of the BLM grazing allotments would ultimately benefit watershed condition in the following ways:

- Open space would be maintained.

- More precipitation would infiltrate the soil profile, reducing surface runoff and peak flood flows.

- Aquifers would be more thoroughly recharged.

- Cienega Creek would have longer periods of surface flows.

- Periods of high soil moisture would last longer across the watershed. (See Cumulative Impacts.)

Alternative 2 would meet the upland vegetation and riparian objectives by controlling shrub invasion. Coupled with improved grazing management, the control of shrubs under Alternative 2 would increase soil cover and much more benefit watershed condition in the long term than would Alternative 1.

Allowing for limited administrative use of mineral materials under Alternative 2 would provide a source of materials for watershed projects. This source could lower costs while ensuring healthy watershed conditions.

Coordinating with private land owners and the Forest Service would likely improve management on adjacent lands that influence runoff and sediment entering BLM watercourses and help to meet both objectives. BLM would investigate, treat, and monitor excessive erosion in Wood Canyon to conserve soil.

Cumulative Impacts - Alternative 2 on Watershed

Under Alternative 2 the Cienega Creek watershed would remain stable and functional over the short term and possibly the long term. In the short term, current grazing management would continue to maintain and improve watershed condition on 64,649 acres of State Trust Lands in addition to the 42,155 acres of public lands with grazing in the watershed. Impacts of concentrated uses, involving roads, utility lines, and range improvements, would degrade the watershed on both State Trust and public lands. But impacts on State Trust Lands might be greater than on public lands, which would have designated utility corridors, roads, and recreation sites.

Continuing public lands grazing on the planning area's ranches would increase the likelihood that they would continue as operating cattle ranches. Such grazing would also encourage ranch families to collaborate with BLM and the Arizona State Land Department in the ranching operation and to manage State Trust and private lands they own or lease as open space. Over the long term improved grazing management and vegetation treatments would maintain watershed health and reduce encroaching woody species in favor of desirable perennial grasses.

The continued existence of large ranches would slow development by reducing the amount of State Trust and private lands open to residential development in the Sonoita Valley. Open space would be maintained. More precipitation would infiltrate the soil profile, reducing surface runoff and peak flood flows. More water would recharge the aquifer. Surface water in Cienega Creek would flow for longer periods. And the watershed would hold more water.

Impacts to Watershed from Alternative 3

From Desired Resource Conditions

Watershed , Fish and Wildlife, Visual, and Cultural Resource Management
Impacts under Alternative 3 would be same as under Alternative 2.

From Land Use Allocations

Mineral Development
Mineral development under Alternative 3 could affect watershed conditions more extensively than under Alternative 1. Under this alternative 46,915 acres of public and split-estate lands would be open to mining and mineral material sales (sand and gravel) as compared to the 6,373 acres of public and split-estate lands under Alternative 1. Mineral development that resulted in extensive mining would likely compromise watershed integrity through surface disturbance and water quality through inadvertent release of toxic materials (Nelson and others 1991). But designating 4,859 acres as areas of critical environmental concern would protect the stream corridor along Cienega Creek from surface occupancy during mineral development.

From Utility Rights-Of-Way and Land Use Authorizations
Utility rights-of-way and land use authorizations under Alternative 3 would affect watershed conditions much as under Alternative 2. In the short term, adding a third utility corridor could disturb 13 more acres of public lands and 15 more acres in other jurisdictions within the watershed.

Off-Highway Vehicle Management
Impacts under Alternative 3 would be the same as under Alternative 1.

Road Designations
The road network under Alternative 3 (open, seasonal use, and restricted to administrative use) would total 125.5 miles and disturb about 182 acres of watershed. The 7.6 miles of nonmotorized single track (converted from roads) trail would disturb 5.5 acres of watershed. Under Alternative 3 BLM would close 11.4 miles or 16.5 acres of road, a reduction of only 8% of the existing road network, much less than under Alternatives 2 or 4. BLM would close roads mostly in sensitive areas along Cienega Creek. Only one road crossing would remain, and BLM would rehabilitate the rest of the crossings to reduce erosion. Road closings under Alternative 3 would improve watershed conditions more than under Alternative 1 but less than under Alternatives 2 and 4.

Arizona Trail
Building the Arizona Trail under Alternative 3 would disturb 5 acres of watershed. Associated camping and wildcat spur trails would disturb slightly more land. Through the Narrows portion of Cienega Creek the Arizona Trail would pass along the floodplain over soils that are fine textured and highly susceptible to erosion. Periodic flooding would degrade the trail, potentially causing secondary channels that alter stream function and contribute to sedimentation. The overall impact under Alternative 3 would be more harmful to watershed function than under Alternative 1.

Recreation
Recreation management described for Alternative 3 is likely to have a more beneficial long-term

impact than under all the other alternatives and would go further in helping to meet the upland vegetation objective. Recreation zones established under Alternative 3 would limit camping-related soil disturbance on 17,690 acres (12% of watershed). The remaining 31,040 acres (21% of the watershed) of public land would remain open to unregulated, dispersed recreation.

Under Alternative 3 dispersed recreation would only slightly disturb the watershed, but disturbance would likely increase over time. As recreation increases over time, BLM would have to monitor impacts and consider further restrictions to sustain watershed conditions that would meet the upland objective. Recreation under Alternative 3 would slightly to moderately harm watershed conditions, depending on the level of use.

Establishing five group sites, five camp areas, and at least 14 pullouts would disturb soil and vegetation cover on 52 acres. Foot and vehicle travel to and around these sites would likely disturb more acreage.

Livestock Grazing

Empire-Cienega Allotment
Grazing management under Alternative 3 would be more likely to degrade watershed conditions over the long term than grazing management under Alternative 1 because of potentially slower adjustments in drought years under Alternative 3. The average stocking rate of nine head year long per section is conservative (NRCS 1988) and close to the annual average stocking rate under Alternatives 1 and 2. This stocking rate, variable pasture rotation, and annual deferment and seasonal rest of pastures should maintain good watershed conditions that would meet the upland vegetation objective in most years. In addition, vegetation treatments under Alternatives 2, 3, and 4 would likely prevent shrub encroachment and promote an increased cover of perennial grasses, which tends to improve watershed conditions.

Impacts from installing stock tanks, pipelines, and fencing would be similar to those described for the Empire-Cienega allotment under Alternative 1. BLM would analyze impacts from these activities in future environmental analyses for specific proposals. But during extended drought this grazing strategy is likely to degrade the watershed if plants lose vigor due to persistently low soil moisture and continued grazing at fixed levels as described in impacts under Alternative 1.

Empirita, Rose Tree, Vera Earl, and Empire Mountains Allotments
On all four of these allotments livestock grazing management under Alternative 3 would affect watershed conditions much as under Alternative 1 except livestock would graze 1,040 more acres on the Empirita allotment under a variable (next best pasture) system with annual rest. BLM would implement variable (next best pasture) systems with annual rest on the other three allotments. A fixed stocking rate of seven head per section for the Empirita, nine head per section for the Vera Earl, and five head per section for the Empire Mountains is conservative (NRCS 1988).

Conservative stocking rates, pasture rotation to prevent grazing from exceeding an average of 35% utilization (moderate use level), and meeting the cover requirements under the upland objective in the short term are likely to allow sustainable use compatible with maintaining or improving watershed condition (Holechek and others 1998) in the short term.

Vegetation treatments would likely improve watershed condition over the long term by reducing and slowing the spread of shrubs in favor of herbaceous plants, especially perennial grasses. But during extended drought this grazing strategy

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is likely to degrade watershed conditions on the four allotments if plants lose vigor due to persistently low soil moisture and continued grazing at fixed levels. This type of grazing management would present more risk of harming watershed condition and function over the long term than grazing under Alternatives 1 or 2.

The potential impacts of fixed stocking rates compared to flexible stocking rates can be illustrated in a simplified model that shows the relationship between vegetation consumption by livestock at different stocking rates and available vegetation production (Figure 4-1).This model shows that the benefit of a flexible stocking rate (Alternative 2), coupled with adequate monitoring, has the benefit of allowing livestock numbers to be adjusted to track annual forage production. This management approach minimizes the risk of using too much of the forage production that needs to be left as vegetation cover for watershed or wildlife.

The risk of set stocking rates, even at conservative levels, is apparent. The set conservative stocking rate (Alternative 3) comes close to annual production levels available at an average 35% utilization rate, and the set maximum stocking rate currently permitted (under Alternative 1) approaches or exceeds the annual production available at a 35% utilization rate. In unfavorable years (drought) this strategy results in livestock consuming much of the annual production and leaving little cover for soil or wildlife.

From Special Designations

Areas of Critical Environmental Concern

The management of areas of critical environmental concern (ACECs) under Alternative 3 would affect watershed condition and function much as under Alternative 2, except that the scope of protection under Alternative 3 would be reduced by 90% to cover 4,859 instead of 45,859 acres. Opportunities for acquiring land would be limited. Moreover, Alternative 3 would not protect Upper Empire Gulch Spring and several other springs and seeps with special management.

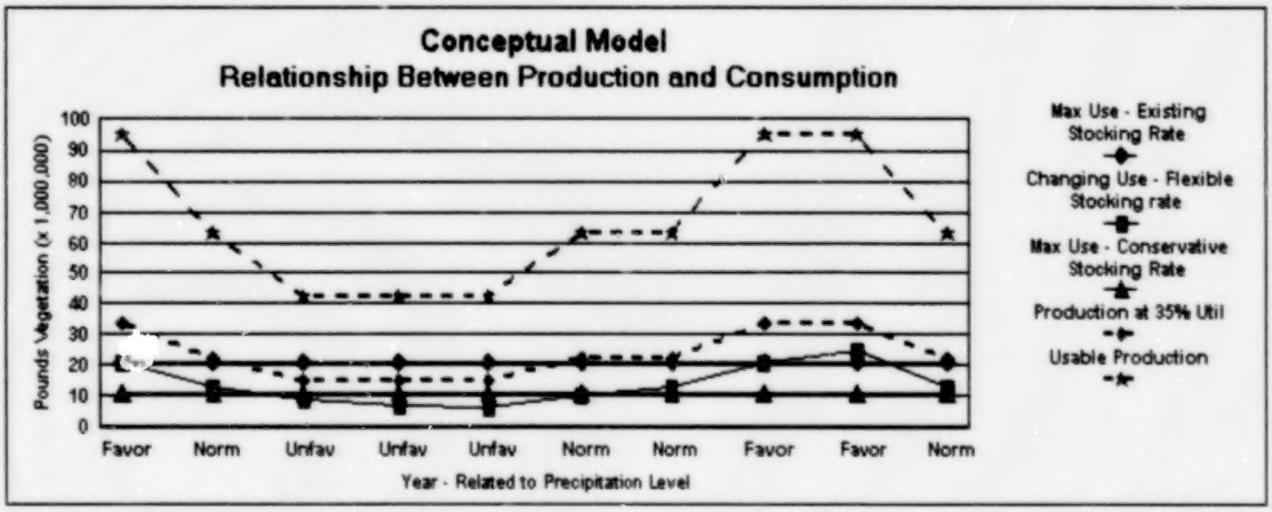

Figure 4-1. Conceptual model comparing annual forage production and forage consumption by livestock during favorable, normal, and unfavorable moisture conditions. Data on consumption is estimated from actual data for the Empire-Cienega allotment and is calculated for a lactating cow with calf.

Summary - Alternative 3 Impacts on Watershed

Under Alternative 3 the watershed of Cienega Creek would remain stable and functional over the short term and possibly the long term. This alternative proposes concentrated activities (roads, rights-of-way, administrative sites, recreation sites, and livestock developments) that could disturb as much as 2,440 acres of public lands distributed throughout the planning area but representing only about 5% of the public lands in the upper Cienega Creek basin. Dispersed recreation impacts could occur on 44,387 acres. Livestock grazing impacts would occur on 43,895 acres. Impacts from mineral development could occur on any of the 46,915 acres open to mineral entry.

Of all the alternatives, Alternative 3 least emphasizes maintaining and improving watershed health. An ACEC to protect the ecological integrity of the riparian areas described for this alternative would likely have limited success because this alternative would risk disturbing watershed conditions such as increased soil cover and soil stability. Alternative 3 places the watershed at substantial risk of disturbance from mining and mineral material sales (sand and gravel) while protecting the core riparian area from surface occupancy related disturbance. Road closures would be few but directed at the areas most sensitive to erosion, such as those along Cienega Creek.

Moderate grazing stocking rates, coupled with vegetation treatment, would likely improve the watershed in the long term. But fixed grazing rates would leave watershed condition at risk of periodic injury during extended droughts (Figure 4-1). In addition, BLM would have to develop a new grazing plan if livestock grazing is not meeting the upland vegetation objective due to this potential problem. In contrast, established recreation zones would limit camping-related soil disturbance on a much larger acreage than the other alternatives, benefitting watershed conditions more than under the other alternatives.

Though less than under Alternatives 1 and 2, these actions would help meet upland vegetation and riparian objectives in the short and long term in most of the planning area when coupled with the following management actions common to Alternatives 2, 3, and 4:

- Treating vegetation to increase grass and limit shrubs.
- Restricting riparian camping.
- Coordinating watershed management with other entities.
- Preventing erosion in Wood Canyon.

Watershed condition would also improve as a result of using the proposed grazing systems on State Trust and private lands that are part of BLM grazing allotments. Traditionally, State Trust Lands are not managed conservatively to improve productivity or watershed conditions. These benefits under Alternative 3 would likely manifest themselves less than under Alternatives 1 or 2 but more than under Alternative 4.

Cumulative Impacts - Alternative 3 on Watershed

Under Alternative 3 the watershed of Cienega Creek would remain stable and functional over the short term and possibly the long term. In the short term, current grazing management would continue to maintain and improve watershed condition on 64,649 acres of State Trust Lands in addition to the 43,895 acres of public lands with grazing in the watershed. Impacts of concentrated uses involving roads, utility lines, and range improvements would degrade the watershed on both State Trust and

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public lands. But impacts on State Trust Lands might be greater than on public lands, which would have designated utility corridors, roads, and recreation sites.

As under Alternative 2, maintaining public lands grazing on the existing ranches in the planning area under Alternative 3 would increase the likelihood of their continuing to operate cattle ranches and would encourage ranch families to collaborate with BLM and the Arizona State Land Department in the ranching operation, and to manage as open space the State Trust and private lands they own or lease. The ranches might be less economically viable with the more conservative stocking rate, but Alternative 3 would still tend to maintain the open space needed for wildlife and water production.

The continued existence of large ranch units would slow development by reducing the amount of State Trust and private lands open to residential development in the Sonoita Valley. Like Alternative 2, Alternative 3 would maintain open space, allowing more precipitation to infiltrate the soil profile and reducing surface runoff and peak flood flows. More water would recharge the aquifer, surface water in Cienega Creek would flow for longer periods, and the watershed would hold more water than if it were developed. Over the long term, watershed health would be maintained by improved grazing management and vegetation treatments to reduce the encroachment of woody species in the plant communities in favor of desirable perennial grasses. But fixed stocking rates would place the watershed condition at risk of periodic widespread injury during extended droughts.

Impacts to Watershed from Alternative 4

From Desired Resource Conditions

Watershed: Upland, Riparian, and Aquatic Vegetation Management

Under Alternative 4 upland vegetation conditions on public lands would not improve as rapidly as under Alternatives 1, 2, or 3 because of the difficulties in conducting joint management activities such as vegetation treatments under a more fragmented land management approach. About 110 miles of fence would be needed to segregate BLM lands. The result would be a patchwork of State Trust Land more suited for disposal than ranching.

Livestock would not graze the public lands, and BLM could treat these areas to improve vegetation and watershed condition. But improving the ecosystem on a large scale would be more difficult. If BLM retires the federal grazing leases and sells the state grazing leases (37,462 acres on the Empire-Cienega allotment and 23,468 acres on the Empirita allotment) due to lack of funding for obtaining commercial leases, then BLM would have little involvement in the planning or management actions on the Empirita or Vera Earl ranches due to lack of land ownership or lease agreements. BLM would then have management responsibilities on only about half of what is currently managed cooperatively on the Empire-Cienega and Rose Tree ranches.

Fish and Wildlife, Cultural and Visual Resource Management

Impacts under Alternative 4 would be the same as under Alternative 2.

From Land Use Allocations

Mineral Development

Alternative 4 would affect watershed function and condition the same as Alternative 2.

Utility Rights-of-Way and Land Use Authorizations

Alternative 4 would better protect watershed function and condition than would Alternatives 1, 2, or 3, which would allow two or more corridors

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to be developed. The designation of a single utility corridor with existing overhead utility lines in the short term could disturb at most 240 acres of public lands and 1,160 acres on other jurisdictions in the watershed. The corridor could also result in continued long-term disturbance on service roads, amounting to about 1 acre on public lands and 14.5 acres total

Soil disturbance could be partially mitigated by treatments, including proper engineering of maintenance road drainage and revegetating disturbance after construction or maintenance. But residual impacts such as service roads are likely to increase runoff, erosion, and sedimentation. This level of disturbance is likely only to slightly disrupt watershed conditions in the long term.

Off-Highway Vehicle Management

Impacts under Alternative 4 would be the same as under Alternative 1.

Road Designations

Impacts under Alternative 4 would be similar to those under Alternatives 2 and 3. The road network under Alternative 4 (open, seasonal use, and restricted to administrative use) would total 116.4 miles and disturb 168.7 acres of watershed. BLM would rehabilitate 27.6 miles of roads or about 40 acres (20%) of the planning area's 199 acres of roads, including sensitive areas along Cienega Creek. Only one road would continue to cross the creek. Rehabilitating the other crossings would reduce erosion. The 29.6 miles of restricted use roads would help prevent wildcat roads in sensitive areas on the watershed.

Arizona Trail

Routing the Arizona Trail along existing roads would eliminate more disturbance of watershed surface area from construction. Some wildcat spur trails would negligibly disturb land along the trail. Locating the trail under Alternative 4 would affect watershed conditions much as under Alternative 1.

Recreation Management

Recreation under Alternative 4 would disturb watershed conditions less than under Alternative 1 but potentially more than under Alternatives 2 or 3. Recreation zones would limit camping-related soil disturbance on 3,270 acres (2% of the watershed). The remaining 45,730 acres of public land would remain open to dispersed recreation, including camping, hiking, and hunting. Such recreation would only slightly disturb the watershed at first, but disturbance would likely increase over time. As under Alternative 2, recreation under Alternative 4 would harm watershed conditions slightly to moderately, depending on the level of use.

Establishing one group site, four camp areas, and at least 10 pullouts would disturb about 27 acres of vegetation cover and soil. Foot and vehicle travel to and around these sites would likely disturb more acreage.

Livestock Grazing

Under Alternative 4 livestock grazing would cease on 41,855 acres of BLM-managed land or 29% of the upper Cienega Creek watershed. This area would meet the upland vegetation objective and benefit watershed function and condition for public lands under Alternative 4 more than it would under Alternative 1. This would not be the case on adjacent State Trust and private lands.

To keep livestock off public land, BLM would have to install 110 miles of fencing. Most of this fencing would be built without blading in roads, and construction would inflict only slight short-term harm to the watershed. Some of the residual effects of grazing, which include soil compaction, mesquite (shrub) invasion, and trail building by cattle (which increases erosion), would fade over time. Stock tanks and other developments would be removed or abandoned. Livestock would no longer degrade the 3 mi^2 of watershed around the 30+ stock tanks. Fence and water line construction and repair would no longer be needed and would no longer disturb the watershed. The network of cattle trails that span the 41,855 acres would heal. Vegetation treatments would reverse shrub invasion over much of the area.

Livestock would no longer consume plant biomass that serves as soil cover and forage used by invertebrates, which loosen soil. The result would be increased water infiltration into the soil, increased soil moisture, and decreased runoff and erosion over the long term.

Grazing would likely continue on State Trust and private lands, but BLM would no longer be involved in these livestock operations. Livestock management on these nonpublic lands could cause a decline in overall watershed condition. This decline would disturb BLM lands and the riparian and aquatic habitats of Cienega Creek. But BLM would not have input into grazing management on these lands. Watershed conditions would be more severely disturbed if private ranches or State Trust Lands are developed (see cumulative impacts).

From Special Designations

Areas of Critical Environmental Concern

ACEC management under Alternative 4 would affect watershed function and condition the same way as under Alternative 2.

Summary - Alternative 4 Impacts on Watershed

Under Alternative 4 the Cienega Creek watershed would remain stable and functional over the short term and possibly the long term. Alternative 4 proposes concentrated activities (roads, rights-of-way, administrative sites, and recreation sites) that could disturb as much as 540 acres of public lands throughout the planning area. This amount represents only 1% of the public lands in the upper Cienega Creek basin. Dispersed recreation could affect 45,730 acres. Livestock grazing impacts would be eliminated over the long term on 41,855 acres. Alternative 4 proposes the withdrawal of another 6,730 acres with the potential of being mined, subject to valid existing rights. Such a withdrawal would virtually eliminate the risk of impacts from mineral development.

Of all the alternatives, Alternative 4 most emphasizes maintaining and improving watershed health on the public lands. But these benefits to watershed condition would be offset on State Trust and private lands that revert to traditional livestock grazing that does not emphasize watershed condition. These benefits would be even more offset if State Trust and private lands are sold for development because the loss of public land grazing has caused their grazing operations to lose their economic viability.

Alternative 4 would designate an ACEC to protect the ecological integrity of the entire planning area. By the following actions BLM would minimize disturbance of soil and vegetation and increase herbaceous soil cover, promoting long-term maintenance and improvement of watershed conditions on public lands and lands acquired within the ACEC:

- Precluding most mining on public lands.
- Eliminating livestock grazing on public lands.
- Designating a single utility corridor in the planning area..
- Applying vegetation treatments.

Road closures would be extensive, limiting runoff and erosion. Camping restrictions under Alternative 4 would be comparatively relaxed, increasing the potential for soil disturbance and the risk of erosion on more acreage than under the other alternatives except Alternative 1.

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More than under Alternatives 1, 2, or 3, these provisions under Alternative 4 would help meet the upland vegetation and riparian objectives on the public lands in the short and long term, especially when coupled with the following management actions:

- Treating vegetation to increase grass and limit shrubs.
- Restricting riparian camping.
- Not authorizing sand and gravel sales.
- Coordinating watershed management with other entities.
- Correcting excess erosion in Wood Canyon.

Cumulative Impacts - Alternative 4 on Watershed

By working as part interest in large ranches in the basin and engaging in mutually agreed-upon progressive range management, BLM has been able to be involved in and affect the management of BLM, State Trust, and private lands. BLM's approach has led to flexible stocking rates that have been below the permitted rates. Flexible stocking rates tied to forage production, coupled with range improvements (paid for with grazing receipts) to improve the control of livestock distribution and rotational grazing systems, have improved watershed cover and soil conditions on public and nonpublic lands. If the partnership is lost as BLM drops out as a stakeholder in the management of large ranches, these ranches might be more likely to resume running at the full permitted limit on State Trust and private lands to make up for the economic loss of public land forage.

Livestock management on these nonpublic lands could degrade overall watershed condition and harm BLM-administered lands, including riparian and aquatic habitats along Cienega Creek. On the Empire-Cienega allotment, the number of head would remain nearly the same to maintain economic viability of the ranch, but the area used would decrease by more than 50% once BLM fences off public lands.

Keeping ranches viable would be complicated by the disjointed pattern of state and private lands in the planning area. With ranching viability affected both by market forces and loss of forage from public lands, sale of land in the basin for development would accelerate. The gains on public lands would likely be offset by a substantial decline in watershed conditions from reverting to traditional grazing practices and converting of private ranches and State Trust Land to urban development. Over the long term further development in the basin and increased stocking densities at fixed numbers are expected to greatly increase runoff and erosion and decrease soil cover and water infiltration into the soil.

Impacts to Water Quality

Impacts From Alternative 1 (Current Management) on Water Quality

Although water quality sampling of the past 9 years has been limited in the Cienega Creek watershed, all samples have met state water quality standards and support all uses designated in the planning area. Therefore, current management would only negligibly lower water quality.

From Desired Resource Conditions

Watershed: Upland, Riparian, and Aquatic Vegetation Management

Current watershed and upland and riparian management would not directly, indirectly, or cumulatively lower water quality.

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Fish and Wildlife Management

Fish and wildlife management under Alternative 1 would generally raise water quality. Even limited actions to improve habitat for special status species would reduce runoff, erosion, sedimentation, and turbidity, improving water quality but not measurably.

Visual Resource Management

Current visual resource management would not affect water quality.

Cultural Resource Management

Actions taken to meet cultural resource objectives would only imperceptibly affect water quality. Restoring historic sites might increase visitation and traffic, worsening road conditions, erosion, and, consequently, water quality. Under Alternative 1 upgrading existing visitor restrooms and water facilities at ranch headquarters would improve water quality because site design would incorporate water quality standards for drinking water, waste disposal, and water treatment for sewage. Water quality testing has been insufficient to determine a baseline, but without updates as part of the headquarters development, water quality at headquarters would continue to decline. Upgrading sanitary facilities at headquarters should also reduce impacts elsewhere from dispersed recreation and the increased use of the Arizona Trail.

From Land Use Allocations

Mineral Development

The 458 acres that would remain open to mineral development under current management would become a potential source of water quality degradation should mining actually occur. Impacts cannot be projected before preparing a mining plan of operations, which would include methods, mitigation, and rehabilitation plans and plans to meet the required conditions established in aquifer protection permits, Section 404 permits, or other permits for protecting water quality.

Utility Rights-of-Way and Land Use Authorizations

Without utility corridor designation, rights-of-way could proliferate, increasing disturbed or exposed surface area, runoff, erosion, and sedimentation in Cienega Creek. Revegetation of disturbed areas would be mitigation required on a case-by-case basis. Negative cumulative impacts of the current management approach to right-of-way and other land use authorizations are likely to exceed those of a designated corridor. An acre of disturbed right-of-way in the Cienega Creek watershed could produce 2 to 3 tons of displaced soil per year. Any action that results in an open-ended increase of disturbed area would have an increasing cumulative effect.

Off-Highway Vehicle Management

Under current management, use of unpaved roads is a significant source of turbidity and sedimentation in streams such as Cienega Creek, which receives runoff from the entire planning area. Without any road closures, the continued and probably increasing use of the existing 136.4 miles of roads in the area would continue to lower water quality in Cienega Creek. Although cumulative increases in runoff and sedimentation would be mitigated by the restriction of OHV use to existing roads, increased use of the existing roads and, therefore, an increasing cumulative impact would be expected. Mitigation through increased road and ditch maintenance would be needed.

Recreation Management and the Arizona Trail

It is difficult to compare current management with its dispersed recreation use to alternatives that concentrate use. The impact of a single use of an existing trail, or camping area, is likely to be similar anywhere it occurs under comparable conditions. But the overall and cumulative negative impacts in runoff, sedimentation, and bacterial contamination of surface water from dispersed, unrestricted recreation as under current management could be greater than that of

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concentrated use. Previously undisturbed areas would more likely be disturbed. Erosion on a new, unmaintained trail would probably be greater than on an established, maintained trail. Limiting use in more erodible areas or areas closer to surface water would be more difficult under current management than under the other alternatives.

The current mix of dispersed and concentrated recreation only slightly lowers water quality. But as use increases under current management, the impacts on water quality from Alternative 1 are likely to increase at a greater rate than that of the other alternatives. Dumping of waste materials now degrades water quality in Empire Gulch.

Livestock Grazing

The current management of grazing would affect water quality much as it would affect watershed, riparian, and aquatic resources.

Empire-Cienega Allotment

Current management and variable stocking rates, depending on conditions in the Empire-Cienega allotment, have moderately improved water quality. Riparian vegetation has been sustained or improved in condition. Exclosures have provided a high level of protection. And short-term, high intensity use of suitable pastures with annual rest has maintained vegetation cover. Maintaining or improving the condition of riparian and upland pasture vegetation is arguably the most important factor in improving water quality.

On the other hand, the continued use of six existing Cienega Creek livestock crossing lanes would temporarily increase turbidity and coliform bacteria. Livestock crossing the creek might increase sedimentation by trampling banks and disturbing streamside vegetation.

Vera-Earl, Rose Tree, and Empirita Allotments

The fixed stocking rates in these allotments are conservative. With adequate rest, impacts on water quality would be short term, and cumulative impacts would be negligible. But not resting areas as planned, perhaps because of drought, could significantly reduce cover and result in runoff, turbidity, sedimentation, and bacterial pollution. Without later adjustments in stocking rates, cumulative harm to water quality would also result.

Not allocating all acres on the Empirita allotment to grazing and not allocating the Empire Mountains to grazing would cumulatively improve water quality in those subwatersheds of Cienega Creek and in Cienega Creek itself as vegetation cover increases.

From Special Designations

Areas of Critical Environmental Concern

No impacts from current management are expected.

Impacts to Water Quality from Alternative 2

From Desired Resource Conditions

Watershed: Upland, Riparian, and Aquatic Vegetation Management

Vegetation treatments planned for the Empire-Cienega and Empirita allotments are likely to increase surface erosion in the short term during a period of reduced cover on 20,000 acres. If treatments are successful, cover should increase after the first rainy season following treatment. Increased vegetation cover would reduce runoff, erosion, and sedimentation of drainages. Changes in other allotments cannot be predicted since further evaluation will be needed before BLM prescribes any treatments.

The following proposed actions would all immediately and cumulatively raise water quality by reducing sediment entering streams:

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- Repairing damaged stream banks.
- Minimizing construction in the 100-year floodplain.
- Prohibiting camping in riparian areas.
- Limiting stream crossings.
- Restricting recreational mining in Cienega Creek.

In many areas runoff from roads degrades water quality much more than any other agent and causes as much as 90% of degradation on steep slopes. Implementing design changes to halt excess erosion on roads would significantly improve water quality in Cienega Creek and its tributaries to an unknown extent.

Fish and Wildlife Management

Fish and wildlife management under Alternative 2 would generally improve water quality. Actions to improve habitat through overall watershed condition improvement would reduce runoff, erosion, sedimentation, and turbidity, helping improve water quality.

Actions proposed to reestablish species are likely to have imperceptible or positive impacts on surface water quality. Generally, riparian and aquatic habitat improvement through periodic rest from grazing and vegetation treatments reduces sedimentation and turbidity in surface waters, improving water quality. Also likely to improve water quality would be actions to improve pronghorn antelope habitat such as low-use primitive camping, limited road use, and acquisition of land and conservation easements.

Visual Resource Management

Designating visual resource management Class II under Alternative 2 would not affect water quality.

Cultural Resource Management

Actions taken to meet cultural resource objectives under Alternative 2 would imperceptibly affect water quality although restoring historic sites might increase visitation and traffic with associated negative impacts on road condition, erosion, and water quality.

Actions in support of cultural resource objectives would negligibly affect water quality. Monitoring and protecting areas subject to soil erosion and other disturbances that would damage cultural sites are also likely to slightly benefit water quality, depending on site locations.

Managing the Empire Ranch headquarters under Alternative 2 would have the same effects as under Alternative 1 except that adaptive reuse of buildings may attract greater numbers of visitors. Alternative 2 would further develop visitor restrooms and water facilities as visitation increases. Developing sanitary facilities at ranch headquarters would somewhat reduce water quality impacts in other recreation zones and impacts on water quality from increased use of the Arizona Trail.

From Land Use Allocations

Mineral Development

Under Alternative 2 continued closure of most of the public lands to new mining would significantly lower the risk of future water quality degradation from heavy metal contamination that could reach Cienega Creek in runoff. Successful petitions to withdraw land now open to mining would further lower the risk. But these changes would have no immediate measurable impact, positive or negative, because water quality data show no effect from current mineral management.

Utility Rights-of-Way and Land Use Authorizations

Alternative 2 would limit impacts to water quality from utility rights-of-way to those now occurring. Any new rights-of-way, if granted, would disturb more surface in the two designated right-of-way corridors.

The degree of impact in increased sediment transport and turbidity is difficult to estimate. Rights-of-way granted on the current pipeline route would increase sedimentation in all tributaries on the west side of Cienega Creek for its entire course in the planning area. Rights-of-way granted on the current power line right-of-way would increase surface disturbance and sedimentation in tributaries on the east side of the northern half of the planning area, especially Mattie Canyon. The impact would diminish as the right-of-way moves farther from Cienega Creek in the south half of the planning area. In either case, Alternative 2 would exclude new disturbance on previously undisturbed land, which would benefit water quality. Seeding, water bars, sediment catchments, and other routine methods of erosion control would significantly mitigate impacts from new surface disturbance.

Off-Highway Vehicle Management

Designating roads for OHV use would reduce the number of roads on which vehicles would travel. Less motorized travel on roads near drainages would reduce the risk of increased sedimentation, turbidity, and accidental spills of petroleum products in Cienega Creek and its tributaries. But road designation poses the long-term risk of degrading water quality should OHV use and related damage increase to a level that offsets the benefits of designated roads. At that point, when runoff from roads threatens to increase sediment, turbidity, or petroleum-related contamination in Cienega Creek, BLM might need to further restrict access. Such impacts cannot be measured because total traffic would increase to unknown levels as use of the planning area increases over time.

Access and Transportation

Limiting access to Oak Tree Canyon and its erodible soils would reduce some sedimentation in nearby drainages. A policy of responding to resource damage caused by transportation should have beneficial cumulative impacts.

Arizona Trail

Under Alternative 2 most of the Arizona Trail would have to be newly built, causing some transitory increase in sedimentation in Cienega Creek, especially where the trail runs close to the creek. Water quality could also be at risk if runoff in Oak Tree Canyon carries sediment into Cienega Creek.

Predicting levels of future use is difficult. But if use increases significantly, risk of fecal coliform contamination in Cienega Creek would also increase. But degrading of water quality is expected to be negligible and avoidable with simple mitigation. Adequate toilet facilities and routine trail maintenance would assure that Cienega Creek would continue to meet water quality standards.

Recreation Management

Recreation zone management under Alternative 2 would affect water quality much as it would affect watershed and riparian areas. These impacts are difficult to project, particularly the cumulative impacts, because they are likely to increase over time at an unknown rate. Even the immediate impacts of concentrating certain types of recreation, groups over 30, car camping, or parking at designated trailhead sites are difficult to assess. Much of that activity is already occurring on those sites. Further concentration of the activity is likely to add slightly to the existing low level of disturbance, with some small increase in runoff and turbidity. These are not likely to be measurable increases.

Reduced ground cover from the group areas at Maternity Well, the Air Strip, and Agricultural Fields is likely to increase sedimentation in streams tributary to Cienega Creek and Empire Gulch. The same affects are likely at the designated camp areas at Oak Tree, Cieneguita, Oil Well, and Road Canyon. Use monitoring and periodically resting these sites could partially mitigate this sedimentation, as could covering the ground with gravel or other materials.

The closeness of heavy use areas to Cienega Creek or its main tributaries increases the risk at Oak Tree and the Agricultural Fields although it might be some time before heavy use develops at the Agricultural Fields. Silty, erodible soils at Oak Tree further increase the risks of water quality degradation as use grows in that area.

Enforcing the day use restriction at Empire Gulch might reduce the dumping of waste material, particularly organic contaminants, that threaten water quality with fecal coliform. BLM has not yet detected violations of water quality standards.

Even where BLM has installed sanitary facilities, the risk of human waste degrading water quality would increase in concentrated use areas and in dispersed hiking and camping areas, particularly near Cienega Creek, Empire Gulch, and main tributaries. As use increases, BLM might need to mitigate this problem by patrolling and cleaning up high-use areas.

This assessment assumes that the following management practices and mitigation are also implemented:

- The Leave No Trace program eliminates human waste from designated recreational areas without sanitary facilities.
- BLM educates visitors and enforces the rules on vehicle use and other destructive visitor behavior.
- When damage occurs, it is promptly repaired.

The proposed multilevel maintenance plan is expected to provide the mitigation and facility maintenance to protect or improve water quality.

Livestock Grazing

Under Alternative 2 livestock grazing would affect water quality much as it would watershed. RMP (resource management plan) level planning would slightly reduce acres being grazed in the planning area. A small increase in cover and decrease in runoff, sedimentation, and possibly fecal coliform contamination might result. In Cienega Creek current levels of turbidity and fecal coliform–the two contaminants attributed to livestock grazing–meet state water quality standards. Therefore, water quality would only slightly improve. Variable stocking rates being used on more of the allotments should respond better to conditions than fixed stocking rates, assuring more cover during drought and improving water quality over time.

Empire- Cienega Allotment

Excluding 2,319 acres from grazing under Alternative 2 might over time reduce runoff and sedimentation in drainages affected by this allotment. The current management strategy would continue on this allotment, not significantly changing water quality.

The use of six existing and two proposed livestock crossing lanes on Cienega Creek would continue to temporarily increase turbidity and coliform bacteria. Livestock crossing the creek might increase sedimentation by trampling banks and disturbing streamside vegetation.

Empirita Allotment

Although the RMP-level planning under Alternative 2 would allow 300 more acres to be grazed on the Empirita allotment than under Alternative 1, changes in management strategy proposed in the activity plan would probably offset any small decrease in water quality. Plans to use a variable stocking rate should result in more cover and less watershed damage during dry periods. Overall, no measurable change in water quality is expected under Alternative 2.

Rose Tree Allotment
A 10% reduction in acres being grazed and the implementing of a variable stocking rate might slightly improve water quality. But water quality in the watershed now meets state standards for turbidity and fecal coliform.

Vera Earl Allotment
A reduction of nearly 15% in acres being grazed and the implementing of a variable stocking rate might slightly improve water quality, although water quality in the watershed now meets state standards for turbidity and fecal coliform.

Empire Mountains Allotment
Livestock grazing in a new 400-acre allotment might increase runoff and sediment and turbidity in the area's drainages. The management plan prepared for this allotment should respond to this possibility with a flexible schedule and stocking rate to protect ground cover, controlling erosion and any threat to water quality from runoff.

The cumulative impacts of livestock grazing management under Alternative 2 are likely to consist of a small reduction of turbidity and fecal coliform in Cienega Creek over time. This improvement in water quality might not be measurable. During dry periods, there is little or no runoff into the creek from the grazing allotments. Current low-flow water quality is good and likely to remain good. During wet periods when runoff flows, natural levels of turbidity are so high that they would obscure changes due to management under Alternative 2.

From Special Designations

Areas of Critical Environmental Concern
Designating all public lands in the planning area as an ACEC under Alternative 2 would not lower water quality. Other limitations, such as prohibiting new mining, would reduce the risk of contaminated runoff and could improve water quality. Prohibiting recreational gold panning in waters of the planning area under implementation plans for Alternatives 2, 3, and 4 would significantly reduce the risk of violating turbidity standards. Water quality would improve the most under Alternatives 2 and 4, which would designate the largest ACEC. But the improvement would also apply to Alternative 3, whose ACECs would include all perennial waters, the most likely areas where people would pan for gold.

Impacts on Water Quality from Alternative 3

From Desired Resource Conditions

Watershed, Fish and Wildlife, Cultural and Visual Resources Management
Impacts under Alternative 3 would be the same as under Alternative 2.

From Land Use Allocations

Mineral Development
Mineral development under Alternative 3 would lower water quality in the same manner as under Alternative 1. But Alternative 3 would open to mineral development a potentially larger area of public lands outside designated ACECs. Opening areas to mineral extraction would increase the risk of future water quality degradation near perennial water or during high runoff. Nevertheless, implementing Alternative 3 itself would not measurably lower water quality.

Utility Rights-of-Way and Land Use Authorizations
Impacts under Alternative 3 would not measurably differ from those under Alternative 2.

Off-Highway Vehicle Management

Impacts of OHV management on water quality under Alternative 3 would be the same as under Alternative 2.

Arizona Trail

The risks of impacts on water quality from the Arizona Trail under Alternative 3 would be comparable to those of Alternative 2. Levels of use are unlikely to differ. Although the length of the trail in the planning area would be 2.5 miles greater, 1 mile would be on existing road.

Recreation Management

Recreation management under Alternative 3 would directly, indirectly, and cumulatively affect water quality much as it would under Alternative 2. A much larger area in Zone 2 under Alternative 3 could slightly increase concentrated use, increasing runoff and the risk of degrading water quality. Alternative 3 would designate two more group sites, one more camp area and day use area, and three more pullout areas. But more measurable runoff into Cienega Creek or its tributaries with sediment, bacteria, or other contaminants from these sites is unlikely until overall use in the planning area greatly increases. As in the assessment of impacts under Alternative 2, this assessment assumes that BLM will install and maintain sanitary and other facilities and enforce the use rules.

Livestock Grazing

At the RMP level, the impacts from Alternative 3 would be the same for the Empire-Cienega, Rose Tree, and Vera Earl allotments as under current management. Impacts on the Empirita and Empire Mountains allotments would increase as the result of an increased area of the allotments being open to grazing. The grazed area of public lands on the Empirita allotment would increase about three-fold, and the Empire Mountains, ungrazed under current management, would come entirely under grazing management. Many areas of shallow soils and steep slopes could significantly increase the risk of erosion and limit the opportunity for recovery. Intense storms with high volumes of runoff are common during the summer wet season and are likely to carry sediment directly to Cienega Creek.

At the activity plan level, the fixed stocking rate under Alternative 3 would degrade water quality on the Empire-Cienega allotment more than under current management. During unfavorable conditions such as drought, Alternative 3's less flexible management could cause overgrazing and insufficient cover to protect the surface. The result could be sedimentation, increased turbidity, and the exceeding of water quality standards for fecal coliform.

The use of six existing and two proposed livestock crossing lanes on Cienega Creek would continue to temporarily increase turbidity and coliform bacteria. Livestock crossing the creek might increase sedimentation by trampling banks and disturbing streamside vegetation.

The activity-level management for the Rose Tree, Vera Earl, and Empirita allotments would not significantly differ. Stocking rates would be slightly lower, and vegetation inventories would be updated on the Vera Earl and Rose Tree allotments. But these actions would be unlikely to affect water quality. Livestock would graze the Empire Mountains at a relatively low, fixed stocking rate, which under unfavorable conditions could degrade ground cover. At later dates, runoff into Cienega Creek could lower water quality.

From Special Designations

Areas of Critical Environmental Concern

ACECs designated under Alternative 3 would improve water quality much as those designated under Alternative 2. The benefits cannot be measured but would be less than under Alternative

2, whose area in ACECs would be 10 times greater than that under Alternative 3.

Impacts on Water Quality from Alternative 4

From Desired Resource Conditions

Watershed, Fish and Wildlife, Cultural and Visual Resources Management
Impacts under Alternative 4 would be the same as under Alternative 2.

From Land Use Allocations

Mineral Development
Alternative 4 would benefit water quality the same as would Alternative 2.

Utility Rights-of-Way and Land Use Authorizations
Construction in rights-of-way under Alternative 4 would cause the same disturbance as under Alternative 2 for the existing power line right-of-way on the planning area's east side. Eliminating new disturbance on the pipeline right-of-way would reduce the risk of increased sedimentation and turbidity in water reaching Cienega Creek from tributaries on the planning area's west side. Eliminating new surface disturbance from construction in rights-of-way anywhere else in the planning area would benefit water quality in the same manner as under Alternative 2.

Off-Highway Vehicle Management
Impacts would be the same as under Alternative 2.

Arizona Trail
Use of the Arizona Trail under Alternative 4 should not degrade water quality as long as Leave No Trace education is effective.

Recreation Management
Impacts to water quality from recreation under Alternative 4 would be the same as under Alternative 2. A slightly smaller area in Zone 2 management could reduce impacts of concentrated use and associated runoff and increases in turbidity or bacterial contamination in Cienega Creek. Changes are not likely to be measurable.

Livestock Grazing
Without livestock grazing under Alternative 4, upland cover is likely to increase. Livestock could no longer disturb riparian areas and stream banks. Infiltration of more precipitation and increased density of vegetation in the riparian areas would be likely to improve water quality. Sediment, turbidity, and fecal coliform in perennial water would decline. But water quality would only modestly improve because upland condition is good and water quality is now meeting state standards under current management.

Cessation of grazing within riparian areas would slightly improve the condition of woody and herbaceous vegetation and further increase bank stability. But improvements would only be slight because livestock do not graze most of the riparian areas under current management except for crossing lanes and a small winter use area. Any riparian areas not in proper functioning condition have resulted from forces other than grazing. Slight improvements in bank stability and upland condition would reduce sedimentation and turbidity in tributary drainages.

From Special Designations

Areas of Critical Environmental Concern
Designating ACECs under Alternative 4 would benefit water quality in the same manner as under Alternative 2.

BIOLOGICAL RESOURCES AND PROCESSES

Impacts to Upland Vegetation

Scope of Analysis: This section uses changes in upland vegetation condition and ability to meet the upland vegetation objective to compare impacts of the alternatives on upland vegetation.

Impacts to Upland Vegetation from Alternative 1 (Current Management)

From Desired Resource Conditions

Watershed: Upland, Riparian, and Aquatic Vegetation Management
Without an integrated vegetation treatment strategy, Alternative 1 would allow mesquite and burroweed to continue to invade grassland sites as a long-term trend. This invasion would decrease herbaceous vegetation cover on the soil surface and increase deeper rooted woody perennials. If the trend continues, ecological condition would fail to meet the Arizona Standards for Rangeland Health.

Fish and Wildlife and Cultural Resource Management
Fish and wildlife and cultural resource management under Alternative 1 would not affect upland vegetation.

Visual Resource Management
Implementing visual resource management Class III could constrain vegetation treatments and range improvements.

From Land Use Allocations

Mineral Development
Under current mineral management, mining could directly disturb upland vegetation on 6,373 acres of public and split-estate lands. Moreover, haul roads, material storage sites, and associated facilities and activities would disturb more upland vegetation. These impacts include the following:

- Destroying and removing vegetation.
- Changing plant communities or conditions.
- Introducing exotics plants.
- Promoting weed invasions.

Both short- and long- term impacts could result, depending on the size, type, and duration of the mine. Impacts would be mitigated to the extent possible through BLM mining regulations and the National Environmental Policy Act (NEPA) process.

Utility Rights-of-Way and Land Use Authorizations
Many of the land uses authorized under current management (rights-of-way for access, utilities, vegetation products, apiaries) require vehicle access roads or work areas that would disturb upland vegetation. The size and nature of the impacts would depend on the actions proposed. BLM develops and incorporates into use authorizations the mitigation for protecting and rehabilitating upland vegetation.

Off-Highway Vehicle Management
Under current off-highway vehicle management, BLM has not fully implemented a designated route system. When vehicles are driven off existing roads and new roads are created, it is difficult to prove that there previously was no road. These "wildcat" roads then become part of the existing road system, which keeps expanding. Each new road disturbs more upland vegetation.

Road Designations
The intermixed land ownership pattern also creates problems. Under current management BLM can regulate use and maintenance of only portions of the planning area's road network on BLM-administered lands. This restriction creates great difficulty in implementing changes in the overall road network and in enforcing regulations that could protect upland vegetation. Protecting

vegetation and soils in sensitive areas subject to erosion is difficult if entities share the road ownership. Problems are recognized on a case-by-case basis, and the big picture is often missed.

Arizona Trail

Alternative 1 would not designate a corridor for the Arizona Trail, and the trail would therefore not affect upland vegetation.

Recreation Management

Under current management, recreation use has steadily increased on the Empire Ranch since BLM acquired the property. Increased visitation has resulted in increases in campsites, parking areas, turnouts, and trails, which have increased vegetation disturbance. Besides trampling more vegetation, expanded recreation has increased unplanned fire starts from vehicles, campfires, cigarettes, and arson. These unplanned fires can harm all resources and remove all vegetation on large portions of the watershed. Unplanned fires can burn when plants are sensitive to damage or in areas susceptible to erosion.

Livestock Grazing

Under Alternative 1 existing livestock operations would continue at current levels on the public lands as shown in Table 2-6. Livestock would graze a total of 41,855 acres of upland vegetation. On BLM-administered public lands, livestock grazing operations must be able to achieve the Arizona Standards for Rangeland Health (Appendix 2) and the objectives developed in the interim grazing plans (Appendix 2). Existing grazing plans have no site-specific interdisciplinary resource objectives for vegetation or wildlife.

Livestock grazing must be able to achieve healthy upland, riparian, and threatened and endangered habitat standards. Under current management mesquite and burroweed are increasing, and perennial grasses are decreasing due to changes in seasonal precipitation, fire suppression, and livestock grazing. Although overall vegetation conditions are improving under current livestock management, mesquite and brush, which are invading in response to past livestock use and fire suppression, might need to be removed through vegetation treatment. Apparent shifts from summer to winter rainfall patterns might also require shrub and tree removal to maintain desired vegetation conditions.

Empire-Cienega Ranch Allotment

Under current management, intensive, short-term grazing, coupled with annual rest of pastures and flexible stocking rates, is improving vegetation conditions on the watershed. The current grazing strategy seeks to improve plant vigor and herbage production and slowly change the species composition to more desirable perennial grasses (Martin 1978). The time needed and the amount of change expected would vary from site to site in the planning area, depending on the site potential of the particular range site (soil type and rainfall zone).

BLM and the livestock operator developed the current livestock grazing strategy with the seasonal growth habits of the key forage species in mind. The rest periods during the spring and summer growing season were designed to physiologically benefit both cool- and warm-season perennial grasses. Continuing this rest through the winter allows the complete phenological development of the grasses before another grazing cycle begins.

Grasses are adapted to grazing pressure because growth originates at the basal meristem, close to the soil surface. Aerial portions are not essential to plant survival and might be regenerated quickly if the root crown is not damaged and if enough photosynthesis has taken place to provide for root development and annual replacement. In fact, moderate grazing might stimulate plant growth because removing plant material with carbohydrate reserves might increase photosynthesis to replace the lost material (Humphrey 1958). Enough

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residual plant material must be left for soil cover, and the grass' energy reserves must not be depleted through repeated grazing during the growing season.

Fence building would not significantly disturb vegetation. Fence lines would not be bladed, and as little brush as possible would be cut. The impacts would be negligible and short term.

Empirita, Rose Tree, and Vera Earl Allotments
The current stocking rate, combined with annual rest of pastures, should improve upland vegetation conditions. Grazing would be adjusted if needed to achieve the Arizona Standards for Rangeland Health.

Impacts from creating any needed range improvements would be similar to those described for the Empire-Cienega allotment. On the Empirita allotment, building the Gary pipeline to replace the creek as a water source would disturb vegetation along the existing roadway for a short period. Future environmental analyses for specific proposals would analyze the nature and degree of impacts from these activities.

From Special Designations

Areas of Critical Environmental Concern
Since Alternative 1 would designate no areas of critical environmental concern (ACECs), no special management of upland vegetation would result.

Impacts to Upland Vegetation from Alternative 2

From Desired Resource Conditions

Watershed: Upland, Riparian, and Aquatic Vegetation Management
Under Alternative 2 upland vegetation management through integrated vegetation treatment would reverse the long-term degradation from grazing and fire suppression that facilitated shrub invasion of grassland ecological sites. BLM would apply prescribed fire, tree and shrub cutting, and herbicide treatments where plant communities have shifted away from dominance by perennial grasses. BLM would also design and implement vegetation treatments to achieve the upland vegetation objective. These treatments would mainly consist of prescribed fire, brush cutting, and the use of herbicides to control mesquite and burroweed. Prescribed fire and herbicides would improve vegetation condition by reducing and slowing the spread of the shrubs in favor of perennial grasses. These treatments would convert 20,000 acres of grassland invaded by mesquite and burroweed to a visual aspect of open grassland.

Requiring permits for collecting and harvesting vegetation products and plants in the planning area would help prevent unnecessary disturbance to upland vegetation by over collecting.

Fish and Wildlife Management
To guide upland vegetation management, BLM must do the following:

- Develop key habitat elements and conditions for the health of special status species.
- Determine desired future vegetation conditions and mosaics of wildlife habitat.
- Resolve conflicting uses.
- Modify vegetation objectives and wildlife subobjectives to reflect the new information.

These tasks would require an increased commitment to monitoring resources and coordinating with other resource users and specialists. BLM would also need research to determine cause-and-effect relationships. In the Empire-Cienega allotment the biological planning process has served this function well. The antelope

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and sparrow cover objectives in this planning effort directly resulted from the biological planning process.

Visual Resource Management
Implementing visual resource management (VRM) Class II could more restrict vegetation treatments and range improvements than managing for VRM Class III under current management, which is slightly less restrictive.

Cultural Resource Management
BLM would need to evaluate cultural resources for all surface-disturbing activities, including vegetation treatments. BLM might also need to develop mitigation to protect cultural resources. Both of these requirements increase the cost of vegetation treatment programs and therefore the cost of achieving desired upland vegetation conditions.

Developing the Empire Ranch headquarters would require stripping some vegetation for parking or access but would result in only slight impacts. Onsite and offsite interpretative and educational programs could help the public understand the grassland ecosystem and how vegetation treatments help sustain that resource.

From Land Use Allocations

Mineral Development
Under Alternative 2 restrictions on mineral development of acquired public lands and the withdrawal of another 6,373 acres of land now open to mineral development would prevent short- and long-term impacts to upland vegetation. Stable vegetation communities would not be at risk from the potential harm of small- or large-scale mining over the short or long term. The scope of the impacts would depend on the potential for mitigation and the scale, location, and type of mine.

The activity plans for Alternatives 2, 3, and 4 would authorize the administrative and casual use of a limited amount of sand, gravel, boulders, and clay. The vegetation disturbed by the administrative and casual use of these materials would cause localized short-term harm to upland vegetation at the material sites. BLM would incorporate mitigation into the authorization to ensure that as little vegetation as possible is disturbed and to require that the site be rehabilitated after operations cease. Any revegetation would require the use of native plants.

Utility Rights-of-Way and Land Use Authorizations
Under Alternative 2 more utility development within the two designated utility corridors where lines already exist could potentially disturb upland vegetation. Service roads could disturb more upland vegetation. Vegetation could be disturbed in both the long and short term along the route. BLM would use the National Environmental Policy Act (NEPA) to design measures to mitigate long-term adverse impacts.

Off-Highway Vehicle Management
Alternatives 2, 3, and 4 would restrict vehicle use to designated roads and implement the designated transportation, eliminating the current confusion with wildcat roads. With fewer wildcat roads being created, visitors would disturb less upland vegetation.

Road Designations
Alternative 2 would retire and rehabilitate 16 miles or 23.2 acres (12%) of the planning area's 199-acre road system. Bare ground would slightly decrease, and vegetation would slightly increase.

Arizona Trail
Trail building under Alternative 2 would disturb about 4 acres of upland vegetation. But associated camping and wildcat spur trails would disturb more land. Overall, Arizona Trail development

under Alternative 2 would disturb slightly more upland vegetation than would Alternative 1, which would not develop the trail.

Recreation Management

Alternative 2 would establish limits and zones for managing recreational use, growth, and development. The level of impact from recreation on upland vegetation is difficult to estimate. Recreation zones would limit camping-related soil and vegetation disturbance on 4,613 acres. Sites used for group camping or staging areas would be graveled or revegetated to protect watershed integrity. Although reducing the amount of upland vegetation, graveling would protect high-use areas and prevent erosion and soil loss from these sites.

The remaining 44,387 acres of public land would continue to be open to dispersed recreation, including camping, hiking, and hunting. These activities would slightly disturb vegetation. BLM would require group events to have permits with stipulations that would mitigate impacts. Only a few designated group sites would cause watershed damage, and these sites would be small. The level of impacts from recreation under Alternative 2 would be somewhat lower than under Alternative 1. Establishing a recreation permit system would allow BLM to adjust recreation levels to ensure that upland objectives continue to be met. Depending on the level of use, recreation under Alternative 2 would slightly to moderately harm upland vegetation.

Livestock Grazing

Livestock would graze a total of 42,155 acres of upland vegetation under Alternative 2. Livestock grazing management under Alternative 2 would benefit watershed condition and function more than under Alternative 1 as described in the impacts to watershed section. Under Alternative 2 BLM-administered public lands would need to meet the Arizona Standards for Rangeland Health as detailed for Alternative 1. To make these standards more site specific, the planning team has developed resource objectives that further define BLM's understanding of what healthy conditions would be in the planning area. When implemented, Alternative 2 management would meet these objectives.

BLM would set up more vegetation study exclosures under Alternative 2 (2,319 acres versus 659 acres under Alternative 1 on the Empire-Cienega allotment) and use them to compare the success of livestock and vegetation treatments in achieving vegetation objectives and healthy watershed conditions. In response to the data collected and assessed, BLM would adjust livestock grazing strategies, and improved upland vegetation management would result.

Creating a new grazing allotment under Alternative 2 in the Empire Mountains would disturb vegetation much as current livestock grazing does on other public lands. But developing and implementing a livestock grazing operation that includes State Trust and private lands would consolidate land controlled by the grazing lessees, easing the area's overall management. Practices to improve watershed condition (such as prescribed burning), endangered species management, and protection of open space would be much easier to accomplish where all land owners have agreed to the vegetation objectives and ownership does not appear to be as "fractured" as it actually is.

From Special Designations

Areas of Critical Environmental Concern

ACEC designation would emphasize protecting more lands by acquisition, conservation easements, or partnerships and would allow BLM to coordinate desired future vegetation condition over a larger proportion of the planning area. This designation would also help direct more resources to achieve the upland vegetation objective.

Impacts to Upland Vegetation from Alternative 3

From Desired Resource Conditions

Watershed, Fish and Wildlife, Visual and Cultural Resource Management

Impacts under Alternative 3 would be the same as under Alternative 2.

From Land Use Allocations

Mineral Development

Under Alternative 3 mineral development would affect upland vegetation as it would under Alternative 1 except that the impacts could occur over a much larger area.

Utility Rights-of-Way and Land Use Authorizations

Under Alternative 3 utility rights-of-way and land use authorizations would affect upland vegetation as under Alternative 2. But the impacts could be greater due to the added right-of-way and associated service roads.

Off-Highway Vehicle Management

Impacts under Alternative 3 would be the same as under Alternative 2.

Road Designations

Alternative 3 would close 17.8 acres of road, mostly in sensitive areas along Cienega Creek. Allowing only one road crossing and rehabilitating the others would reduce erosion. Watershed function and upland vegetation condition would improve slightly more than under Alternative 1.

Arizona Trail

The Arizona Trail under Alternative 3 would affect upland vegetation the same as under Alternative 2.

Recreation Management

Under Alternative 3 the level of impact from recreation on the watershed and on upland vegetation would be less than under Alternatives 1 or 2 because more area would be restricted to designated sites as described in the impacts to watershed section. Establishing a recreation permit system would allow BLM to adjust recreation levels to ensure that upland objectives continue to be met. As under Alternative 2, adverse affects of recreation on vegetation would be slight to moderate, depending on the level of use.

Livestock Grazing

Livestock would graze 43,895 acres of upland vegetation under Alternative 3. For most years management on the five allotments would meet the upland vegetation objects as a result of the following:

- Conservative fixed stocking rates.
- Scheduled pasture rotations.
- Annual and seasonal rest of pastures.
- Vegetation treatments such as prescribed fire.

During extended drought the risk of overstocking and overgrazing would increase because livestock management could not change as fast as field conditions might require. Thus this grazing strategy might degrade vegetation and the watershed if plants lose vigor because of persistent low soil moisture and continued grazing at fixed levels.

Impacts from livestock waters, and other improvements under Alternative 3 would be the same as under Alternative 1. This type of grazing management could result in long-term harm to vegetation and watershed condition more than under Alternatives 1 or 2.

From Special Designations

Areas of Critical Environmental Concern
Alternative 3 would affect upland vegetation much as would Alternative 1 except that Alternative 3 would reduce the scope of protection by about 90% to cover 4,859 instead of 45,859 acres. Moreover, opportunities for land acquisition would be limited under Alternative 3.

Impacts to Upland Vegetation from Alternative 4

From Desired Resource Conditions

Watershed, Fish and Wildlife, Visual, and Cultural Resource Management
Impacts under Alternative 4 would be the same as under Alternative 2.

From Land Use Allocations

Mineral Development
Mineral development under Alternative 4 would affect upland vegetation the same as it would under Alternative 2.

Utility Rights-of-Way and Land Use Authorizations
Impacts on upland vegetation under Alternative 4 would be similar to those described for Alternative 2 but would be less harmful because Alternative 4 would limit impacts to one corridor.

Off-Highway Vehicle Management
Impacts under Alternative 4 would be the same as under Alternative 2.

Road Designations
Under Alternative 4 BLM would close and rehabilitate 27.6 miles of roads or about 40 acres, including sensitive areas along Cienega Creek. Only one road crossing would remain open. The rest would be rehabilitated to reduce erosion. The 29.6 miles of restricted use roads would help prevent wildcat roads in sensitive areas in the watershed and would reduce disturbance of upland vegetation. Adverse impacts under Alternative 4 would be slightly less than under Alternative 1.

Arizona Trail
Placing the Arizona Trail along existing roads would eliminate any more disturbance of upland vegetation from trail construction. Some wildcat spur trails would negligibly disturb upland vegetation next to the trail. Consequently, the Arizona Trail under Alternative 4 would affect upland vegetation conditions much as it would under Alternative 1, which proposes no trail.

Recreation Management
The level of impact from recreation under Alternative 4 would affect vegetation less than would recreation under Alternative 1. Alternative 4 would set up recreation zones that would limit camping-related vegetation disturbance on 3,270 acres and would periodically revegetate the group camping site. The remaining 45,730 acres of public land in the planning area would remain open to dispersed recreation, including camping, hiking, and hunting. At first, dispersed recreation would disturb only a small amount of vegetation. But the impacts would increase with recreation use over time. As under Alternative 2, establishing a recreation permit system would allow BLM to adjust recreation to ensure that upland vegetation continues to meet its objectives. Depending on the level of use, recreation under Alternative 4 would slightly to moderately harm upland vegetation.

Livestock Grazing
Under Alternative 4 BLM would not authorize livestock grazing on any public lands it administers in the planning area. BLM would take 41,855 acres out of livestock production within the four existing allotments. Livestock would no longer consume upland vegetation on these acres, but the following residual effects of grazing would remain at least in the short term:

- Changes in species composition.
- Increases in invasive species.
- Increases in certain exotic species.

The upland objective would be achieved by applying vegetation treatments. BLM would be likely to sell the state grazing leases unless it can obtain the resources to pursue a commercial permit. Therefore, grazing would continue on State Trust and private lands at least in the short term. If it sells the state grazing leases, BLM would no longer be involved in managing upland vegetation on intermixed State Trust Lands.

If grazing continues on intermixed State Trust and private lands, BLM would need to fence the public lands to keep out livestock. About 110 miles of fencing would be needed at an estimated cost of $555,000. In addition to the required fencing, BLM would have to assume the maintenance responsibility for the new fencing as well as for the existing boundary fencing. BLM's experience in managing the San Pedro Riparian National Conservation Area also shows the need for hiring more staff to detect and resolve unauthorized grazing.

From Special Designations

Areas of Critical Environmental Concern

ACEC management under Alternative 4 would affect upland vegetation the same as under Alternative 2.

Impacts to Noxious Weeds

Scope of Analysis: This section uses the risk of invasion or spread of noxious weeds to assess the impacts of the alternatives.

Impacts to Noxious Weeds from All Alternatives

Under all alternatives a variety of human uses of the Empire-Cienega Planning Area could introduce noxious weeds. Livestock and recreational use would be sources of noxious weeds. Although the current livestock operators do not use supplemental feed for cattle, feed for horses used in livestock operations might not be weed free. As visitors increase, so does the probability of surface disturbance. Such disturbance would increase the likelihood of noxious weeds' being introduced to the area. Revegetating with native plants following disturbances such as fire, utility line construction, or recreation developments would minimize the spread or introduction of exotic or invasive species from project development.

Under Alternatives 2, 3, and 4 the designation of the public lands in the planning area as a weed management area would provide guidance and resources to combat invasions of noxious weeds. Reducing miles of road for motor vehicle use would slightly reduce the risk of spreading certain noxious weeds from the risk under Alternative 1. Implementing integrated vegetation treatment, including prescribed fire, could help control some noxious weeds but could spread others such as Lehmann's lovegrass. BLM would consider this possibility in project design and mitigation.

Under Alternative 4 removal of livestock grazing would reduce one risk factor in the introduction and spread of noxious weeds. Further reduction in miles of roads for motor vehicle use would slightly reduce the risk of spreading certain noxious weeds from the risk under all other alternatives.

Cumulative Impacts-Noxious Weeds

One of the planning area's goals is to maintain and restore native plant diversity and abundance. Without proper management, tamarisk (salt cedar) and other species such as Lehmann's lovegrass can crowd out native species and dominate the landscape. Residential developments are another source of noxious weeds. As the surrounding area continues to grow, the risk of noxious weeds on the public lands increases.

Impacts to Wetland/Riparian Areas

Scope of Analysis: This section uses changes in riparian condition and function and the ability to meet the riparian objective to compare the impacts of the alternatives on wetland and riparian areas.

Impacts to Wetland/Riparian Areas from Alternative 1 (Current Management)

From Desired Resource Conditions

Watershed: Upland, Riparian, and Aquatic Vegetation Management

Watershed function is an important factor in maintaining stream function (Meehan 1991) and is extremely important to cienegas, which are sensitive to flood disturbance (Hendrickson and Minckley 1984). If the watershed condition and function eventually become degraded, correspondingly rapid stream adjustments from changes in peak flows and sediment inputs would temporarily degrade riparian resources until the stream attains a new stable state. Increased flood peaks might reduce the extent of cienega habitat. The riparian vegetation objective would not be met until upland watershed conditions are also met by reducing the amount of shrub invasion and increasing the desirable perennial grass component in the vegetation communities.

Under Alternative 1 the lack of vegetation management might result in conditions that prevent Cienega Creek from meeting the riparian objective. Watershed function is an important factor in maintaining stream function (Meehan 1991) and is extremely important to cienegas, which are sensitive to flood disturbance (Hendrickson and Minckley 1984). If the watershed condition and function eventually become degraded from decreased soil stability and decreased cover from shrub invasion, then correspondingly rapid stream adjustments from changes in peak flows and sediment inputs would temporarily degrade riparian resources until the stream attains a new quasi-stable state. Increased flood peaks are likely to reduce the extent of cienega habitat through incision (Hendrickson and Minckley 1994).

Fish and Wildlife, Visual Resource, and Cultural Resource Management

Under Alternative 1 fish and wildlife management, visual resource management, and cultural resource management would not affect riparian/wetland areas.

From Land Use Allocations

Mineral Development

Although the area open to mining under Alternative 1 is a relatively small percentage of the public lands, the riparian objective might not be met if large-scale mineral development occurs on these areas or on surrounding lands in the watershed. Large-scale mineral development could lower water quality and quantity. Water quality might be lowered by increased sedimentation from large-scale soil disturbance and inadvertent release of toxic materials (Nelson and others 1991).

Surface water is limited in the Cienega Creek and Babocomari River basins. Extracting water for large-scale mining would reduce aquatic and riparian habitat. Large mines often result in an influx of development to support miners. New water developments for supporting new businesses and residences could reduce groundwater that ultimately feeds Cienega Creek and other riparian habitats. The harm could be negligible to severe, depending on the scale, location, and type of mine.

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Utility Rights-of-Way and Land Use Authorizations

Adding new utilities under Alternative 1 would still allow the riparian objective to be met unless utilities proliferate and have a widespread effect on watershed conditions. Increases in sedimentation and runoff from utility corridor development could be substantial. BLM would discourage utilities from crossing riparian zones, but a major utility could greatly degrade these areas. Such degradation could lead to bank instability and sedimentation but would be mitigated because of the high value of the resources, including endangered species.

Off-Highway Vehicle Management

Limiting off-highway vehicle travel to designated roads under Alternative 1 would protect riparian vegetation and banks from disturbance from cross-country vehicle traffic and should facilitate meeting the riparian objective.

Road Designations

The 11 fords that cross Cienega Creek are a source of sedimentation to the creek. These crossings provide access to recreation and extend the area of disturbance. This source of degradation would slightly harm riparian function under Alternative 1.

Arizona Trail

Alternative 1 would not designate a trail corridor, but the lack of such a corridor would not affect wetland-riparian areas.

Recreation Management

The lack of designated recreation zones under Alternative 1 would interfere with meeting the riparian objective only if use levels increase dramatically. Recreation is light in the riparian area along Cienega Creek and Mattie Canyon but is heavy enough in upper Empire Gulch to create some trails and light bank damage. As recreation increases in the planning area, visitors would create more hiking trails where roads provide access. Water and shade of riparian areas attract people. Bank and floodplain soils are fragile within the planning area's riparian zones. Trails and bank damage are likely to promote erosion and retard riparian development in some areas in the future as visitation to the planning area increases. If bank damage becomes extensive, the stream channel would adjust from bank erosion and sedimentation to become wider and more shallow in profile with fewer deep pools (Rosgen 1996).

Livestock Grazing

Watershed function is important in maintaining stream function (Meehan 1991) and is extremely important to cienegas, which are sensitive to flood disturbance (Hendrickson and Minckley 1984). A benefit from the improved watershed condition is the improvement of riparian conditions and later aggrading of the Cienega Creek base level, increasing the capacity of the aquifer in the valley. In the short term, decreased runoff and improved water retention on uplands are expected to reduce peak flood flows and increase infiltration and aquifer recharge. But without upland vegetation treatments, over time, shrub invasion is likely to offset gains made through advances in grazing practices (see impacts to riparian areas from vegetation treatment).

The overall impact of continued implementing of current grazing plans under Alternative 1 would be exclusion of livestock and their direct impacts from most of the riparian zone on Cienega Creek, Mattie Canyon, and Empire Gulch on the Empire-Cienega and Empirita allotments. This exclusion would allow plant succession within these riparian areas to progress rapidly toward the potential natural community, either the cottonwood-willow community or the interior marshland complex. The trend is away from a cottonwood-willow plant community toward a marshland (cienega) with a willow component. Increases in vegetation cover, structure, and composition in the riparian zone would improve bank stability and result in a more stable and flood-resistant channel morphology (Hendrickson and Minckley 1984; Platts 1991). Improved riparian function is expected to increase overbank flow, shallow aquifer water capacity, and recharge, increasing the creek's drought resistance and enhancing riparian development.

For about 6 weeks during the summer cattle simultaneously graze and use Cinco Ponds as water points. In some years they graze herbaceous vegetation to the waterline and heavily trample banks. Bulrush and other riparian plants regrow after cattle move to another pasture. Sedimentation and accumulation of cattle waste products diminish water quality. Bank damage would likely result in the filling and widening of these ponds, slowly leading to less open water and more coverage by aquatic plants. Grazing of these ponds would directly harm the riparian plant community and the longevity of open water.

During the short term the use of six existing lanes to allow cattle to cross Cienega Creek for pasture rotation would negligibly affect the soils and disturb vegetation and stream banks on up to 4 acres of riparian habitat. Cattle would probably use only an individual lane once a year for just over a week. While using these lanes, they would trample the soil, decreasing bank stability and increasing the opportunity for localized water erosion from soil disturbance.

Livestock are now grazing along 2 miles of perennial Cienega Creek every other year during the winter (nongrowing season) only. The riparian condition data shows an improving trend and satisfactory condition. Restricting grazing in this area to winter use is expected to continue in order to promote desirable habitat features such as vigorous plant growth and good bank stability. The livestock operator is currently fencing this reach to exclude livestock to mitigate any direct impacts.

From Special Designations

Areas of Critical Environmental Concern

Alternative 1 would designate no more ACECs with specific management actions to protect sensitive wetland and aquatic areas. The lack of ACEC designation and management prescriptions for these areas would be harmful compared to the other alternatives.

Impacts to Riparian/Wetland Areas from Alternative 2

From Desired Resource Conditions

Watershed: Upland, Riparian, and Aquatic Vegetation Management

Improved watershed condition under Alternative 2 would benefit wetland and aquatic areas. Treatments to reduce shrubs and increase perennial grass cover would further reduce sedimentation and the frequency of peak flood flows and increase groundwater recharge, which feeds springs that support the planning area's riparian plant communities.

But prescribed fire might cause localized short-term harm from loss of mature cottonwood, willow, ash, and walnut trees should it temporarily get out of control. Individual burn plans for each year would incorporate mitigation to reduce the risk of damage to riparian areas. The small acreage likely to be burned and the relatively high humidity and fuel moisture would protect most of the trees and other riparian plants closer to the stream channel.

Riparian plant communities of semidesert grasslands have burned periodically (Davis 1994), and this burning has influenced the plant community. Limited accidental burning of riparian zones would likely cause limited short-term harm to these areas.

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BLM would design herbicide use for removing invasive or exotic plants to mitigate most potential harm to nontarget plants and animals and further analyze potential impacts in site-specific treatment plans.

Upland vegetation treatments that offset the influence of grazing on shrub invasion would lessen the impacts of grazing to the watershed's long-term health, thereby improving hydrologic relationships and reducing sediment loads.

Fish and Wildlife Management

Proposed actions common to Alternatives 2, 3, and 4 for fish and wildlife management would benefit riparian/wetland areas. Securing an instream flow water right would help assure the sustainability of perennial water in Cienega Creek over the long term, helping maintain the biodiversity in the basin for future generations. Restrictions on livestock and recreation use of riparian areas to protect threatened and endangered species would also protect riparian vegetation and stream banks.

Reintroducing beaver would affect channel geometry and riparian expression in several ways. Beaver dams would slow and spread out flood waters onto floodplains where channel widths are expansive. Dams would cause erosion along the perimeter of the new floodplain in incised stream segments created after the drought and flood cycle of the 1890s. This erosion would further widen narrow areas.

Dams are also likely to cause evulsion (the dramatic lateral change in channel location following a flood) of the stream channel onto the floodplain, allowing greater lateral migration of the channel and expanding the surface area of marsh habitat. Beaver activity, particularly new dam building would follow this evulsion process. This activity would also serve to stabilize and elevate the channel over time by slowing the headward movement of gully erosion and by trapping sediment that fills beaver ponds.

Because Cienega Creek flows through a wide valley basin with floodplains ranging up to a half mile across and with a gentle slope less than 1%, most of the stream can accommodate physical changes caused by beaver dams. Vegetation would respond to tree felling by resprouting from downed limbs and stump bases and in so doing would enhance aquatic habitat diversity. Ground water elevations might rise as the channel as a whole aggrades. Overbank flooding and storm flow retention time is likely to increase bank recharge. Poole (2000) has shown that this type of recharge can be important to the overall water budget in the adjacent San Pedro Basin.

Visual Resource and Cultural Resource Management

Proposed actions common to Alternatives 2, 3, and 4 for visual and cultural resource management would generally not affect riparian/wetland areas. Public information about riparian/wetland areas at the Empire Ranch headquarters would lead to increased public awareness. This awareness would likely contribute to increased public support for further constraints on activities that are detrimental to riparian/wetland areas in the basin and benefit these areas.

From Land Use Allocations

Mineral Development

By eliminating the potential for mining on public lands, Alternative 2 would greatly reduce the risk of impacts of mines (riparian habitat degradation from sedimentation, excessive water use, and contamination), which are described for Alternative 1. Some of these impacts could still occur if large-scale mines are developed on surrounding lands.

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Utility Rights-of-Way and Land Use Authorizations

Designating utility corridors away from riparian areas under Alternative 2 would eliminate the risk of new utilities directly affecting these areas, as might occur under Alternative 1. The single "aerial" crossing of the existing corridor little affects the riparian area. Future utilities using this corridor would likely apply the same mitigation. Restricting service roads to upland areas would prevent direct harm to riparian areas.

Off-Highway Vehicle Management

Off-highway vehicle management under Alternative 2 would affect riparian areas the same as under Alternative 1.

Road Designations

Only 1 of the 11 road crossings through riparian/wetland areas would remain under Alternative 2. Retiring and rehabilitating these road crossings on the floodplain would alleviate the bank erosion and sedimentation that would occur under Alternative 1.

Arizona Trail

Under Alternative 2 the Arizona Trail would not be located close enough to the riparian area to have a direct impact. But extra visitation by hikers might slightly degrade bank stability and vegetation. Hikers wanting access to the riparian area are likely over time to create small wildcat spur trails.

Recreation Management

Under Alternative 2 limits on road access to and camping near riparian areas would restrict the amount of recreation that might disturb the soil and lead to erosion and vegetation damage. Restricting vehicle access to Cienega Creek would prevent more erosion from illegal off-highway vehicle traffic along the creek.

Foot and horse traffic along Cienega Creek would increase as the planning area becomes better known to the public. Erosion is likely to greatly increase if hikers and horseback riders create trails on the fragile soils along the banks or floodplain of Cienega Creek. Alternative 2 would better protect the riparian area along Cienega Creek than would Alternative 1. Recreation is likely to be slightly to moderately harmful to riparian areas. Establishing a recreation permit system would help ensure that use levels help maintain riparian function and condition.

Livestock Grazing

Management of livestock grazing under Alternative 2 is likely to benefit riparian areas more than under Alternative 1 because of the improvement in watershed conditions as a result of vegetation treatments, including prescribed fire, coupled with variable stocking rates and flexible rotation systems determined by resource conditions through biological planning. Livestock exclosures on Cienega Creek below the Narrows and at Nogales and Little Nogales springs would ensure that the vegetation would reach its potential natural state in the least amount of time and with fewest setbacks from livestock management problems.

During the short term the use of six existing and two proposed lanes to allow cattle to cross Cienega Creek for pasture rotation would negligibly affect the soils and disturb vegetation and stream banks on up to 5 acres of riparian habitat, slightly more than under Alternative 1. Cattle may use an individual lane for up to 3 weeks, usually every other year. While using these lanes, they would trample the soil, decreasing bank stability and increasing the opportunity for localized water erosion from soil disturbance.

Public lands in the Rose Tree Ranch, Vera Earl Ranch, and Empire Mountains would benefit from the more intensive management and collaboration under Alternative 2, including completion of ecological site inventories and monitoring. Improvements in watershed condition on all allotments should indirectly benefit riparian and wetland areas. Implementing the biological planning process on all allotments should help recognize and resolve resource conflicts and also indirectly benefit these areas.

From Special Designations

Areas of Critical Environmental Concern
ACEC designation under Alternative 2 would emphasize agency conservation of watershed health and processes that benefit riparian and stream conditions. This designation would direct more agency resources to conserving the planning area's riparian resources and benefit riparian/wetland areas.

Cumulative Impacts to Wetland/Riparian Areas from Alternative 2

Upstream improvement in watershed conditions might benefit downstream segments of Cienega Creek into Tucson through indirect and cumulative benefits such as reduced flood peak discharge, attenuating flood discharge, and increased base discharge (Hendrickson and Minckley 1984).

Impacts to Wetland/Riparian Areas from Alternative 3

From Desired Resource Conditions

Watershed, Fish and Wildlife, Cultural, and Visual Resource Management
Impacts under Alternative 3 would be the same as under Alternative 2.

From Land Use Allocations

Mineral Development
Mineral development under Alternative 3 could affect riparian areas more than under Alternative 1 because areas open to mineral development would be more extensive and have a greater potential for more large-scale mineral development. But Alternative 3 would protect Cienega Creek, lower Empire Gulch, Cinco Ponds, Mattie Canyon, and Nogales and Little Nogales springs from direct impacts of mineral entry and surface disturbance.

Utility Rights-of-Way and Land Use Authorizations
Utility rights-of-way and land use authorizations under Alternative 3 would affect riparian areas the same as under Alternative 2.

Off-Highway Vehicle Management
Off-highway vehicle management under Alternative 3 would affect riparian areas the same as under Alternative 1.

Road Designations
Road closures and restrictions under Alternative 3 would affect riparian areas much as they would under Alternative 2 except that Alternative 3 would close and rehabilitate a smaller acreage of roads.

Arizona Trail
Under Alternative 3 the Arizona Trail would follow the riparian area through the Narrows and pass over fragile floodplain soils. Later flooding might start erosion, causing the trail to down cut. Down cutting might create secondary channels that would disturb stream function. Hikers leaving the trail might to some degree disturb bank stability and vegetation, depending on the level of use. If the trail passes over the floodplain, channel adjustments would directly harm riparian resources and channel function. The impacts would be greater than under the route proposed by Alternative 2.

Recreation Management
Under Alternative 3 recreation would affect riparian areas the same as under Alternative 2.

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Livestock Grazing

Livestock grazing management under Alternative 3 might impair watershed condition during drought. Because watershed function is integral to riparian function through effects on the hydrologic response to watershed conditions, livestock grazing could harm riparian area condition and stream channel function. Reductions in watershed cover might increase runoff, flood peaks, and sedimentation, and decrease aquifer recharge and base flows (Dunne and Leopold 1995; Thurow 1991). Because few livestock would graze in riparian areas, vegetation is likely to buffer the channel against erosion and somewhat filter excess sediments.

Livestock would continue to use Cinco Ponds and degrade the area much as they would under Alternative 1. Impacts from crossing lanes, livestock waters, and other improvements under Alternative 3 would be the same as under Alternative 2. Overall, grazing management under Alternative 3 would degrade riparian condition and function more than under Alternatives 1 or 2.

From Special Designations

Areas of Critical Environmental Concern

Alternative 3 would reduce the area within ACECs by about 90% compared to Alternative 2. Nevertheless, ACECs would still cover most riparian areas and valley bottoms, including Cienega Creek, Cinco Ponds, lower Empire Gulch, Mattie Canyon, and Nogales and Little Nogales springs. Upper Empire Gulch would not be protected by ACEC designation and management emphasis to maintain ecological integrity. The impact of ACEC management to riparian areas under Alternative 3 would be more beneficial than under Alternative 1, which would designate no more ACECs.

Cumulative Impacts to Wetland/Riparian Areas from Alternative 3

Cumulative impacts under Alternative 3 would be the same as under Alternative 2.

Impacts to Wetland/Riparian Areas from Alternative 4

From Desired Resource Conditions

Watershed, Fish and Wildlife, Cultural, and Visual Resource Management

Impacts under Alternative 4 would be the same as under Alternative 2.

From Land Use Allocations

Mineral Development

Under Alternative 4 mineral development would affect riparian areas the same as under Alternative 2.

Utility Rights-of-Way and Land Use Authorizations

Utility rights-of-way and land use authorizations under Alternative 4 would affect riparian areas the same as under Alternative 2.

Off-Highway Vehicle Management

Off-highway vehicle management under Alternative 4 would affect riparian areas the same as under Alternative 1.

Road Designations

Road closures and restrictions under Alternative 4 would affect riparian areas the same as under Alternative 2.

Arizona Trail

The Arizona Trail under Alternative 4 would affect riparian areas the same as under Alternative 2. The impacts of a minor increase in disturbed land in the watershed resulting from the creation of a

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new trail under Alternative 2 would be negligible and comparable to impacts from restricting the trail to shared use on existing roads under Alternative 4.

Recreation Management
Under Alternative 4 recreation would affect riparian areas the same as under Alternative 2.

Livestock Grazing
Grazing management under Alternative 4 would benefit riparian resources. Eliminating livestock grazing on public lands under Alternative 4 would affect riparian areas in much the same way as under Alternatives 1, 2, and 3 since these alternatives would virtually eliminate direct cattle impacts to riparian areas. The difference is that Alternative 4 would eliminate existing crossing lanes, which would further improve riparian condition in 1,800 linear feet of riparian area (4 acres) along Cienega Creek. In addition, Cinco Ponds would remain undisturbed by heavy grazing and bank trampling. Alternative 4 would also benefit watershed condition and function by eliminating impacts from livestock and range improvements in the uplands on public lands and might indirectly benefit the riparian system. An improvement of some degree in watershed function is expected to result in the following benefits to riparian resources:

- Decreased peak flows.
- Decreased sedimentation.
- Increased infiltration and aquifer recharge.
- Increased duration and length of perennial flow.

But the failure of the management of the State Trust and private lands next to the BLM properties to provide desirable vegetation and soil relationships could degrade sensitive riparian and aquatic habitats on the public lands to unacceptable levels (see watershed section).

From Special Designations

Areas of Critical Environmental Concern
Under Alternative 4 ACEC management would affect riparian areas the same as under Alternative 2.

Cumulative Impacts to Wetland/Riparian Areas from Alternative 4

Under Alternative 4 watershed function would improve on 41,855 acres of BLM-managed land or 29% of the upper Cienega Creek watershed. This is not expected to be the case on adjacent State Trust and private lands (see watershed section). Upstream improvement in watershed conditions on public lands might be overshadowed by degradation elsewhere in the watershed. Such changes are likely to result in the following:

- Increased peak discharges during floods.
- Increased sedimentation.
- Decreased recharge.
- Increased water withdrawals resulting in decreased base discharge.

All of these changes are likely to culminate in indirect, cumulative long-term harm to cienega-type wetlands (Hendrickson and Minckley 1984).

Impacts to Fish and Aquatic Wildlife

Scope of Analysis: This section uses changes in habitat features and populations of fish and aquatic wildlife to compare the impacts of the alternatives on fish and aquatic wildlife.

Impacts to Fish and Aquatic Wildlife from Alternative 1 (Current Management)

From Desired Resource Conditions

Watershed: Upland, Riparian, and Aquatic Vegetation Management

Under Alternative 1 the lack of integrated vegetation management might create conditions that prevent Cienega Creek from meeting the aquatic portion of the riparian objective over the long term and would harm federally listed aquatic wildlife and plants. Watershed function is important in maintaining stream function (Meehan 1991) and is extremely important to cienegas, which are sensitive to flood disturbance (Hendrickson and Minckley 1984). Under Alternative 1 habitat changes, including loss of pools from sedimentation and loss of cover from channel adjustments (see impacts to watershed section above), would degrade aquatic habitat important to federally listed and other wildlife.

Fish and Wildlife Management

Under all alternatives BLM would consult with the U.S. Fish and Wildlife Service on all projects that might affect any listed species or critical habitat. This consultation would ensure that activities in aquatic environments are fully mitigated and their adverse impacts on endangered or threatened species are minimized. The range of the Gila topminnow would be extended to improve the status of the Cienega Creek lineage. Improvements in the status of endangered species would reduce the likelihood of extinction and might eventually lead to the recovery of the species to the point that it no longer needs to be listed.

Visual Resource Management

Management as VRM Class III under Alternative 1 is not expected to affect aquatic habitat conditions and wildlife.

Cultural Resource Management

Cultural resource management under Alternative 1 would not affect fish and aquatic wildlife.

From Land Use Allocations

Mineral Development

The aquatic habitat portion of the riparian objective might not be met if mining becomes extensive in the planning area. Large-scale mineral development can affect both water quality and quantity. Surface water is limited in the Cienega Creek and Babocomari River basins. Extraction of water for large-scale mining would reduce aquatic habitat for native fishes, leopard frogs, Mexican garter snakes, and a host of migrating or nesting neotropical birds. Listed or soon to be listed under the Endangered Species Act of 1973 are the following species that could be affected by mineral development:

- Southwestern willow flycatcher.
- Gila topminnow.
- Huachuca water umbel.
- Gila chub.
- Yellow-billed cuckoo.
- Chiricahua leopard frog.

Large mines often result in an influx of development close to the mine to support workers. New water developments used to support new businesses and residences could lower the ground water that ultimately feeds Cienega Creek and other aquatic habitats (Naeser and St. John 1996).

In addition, an increase in the population next to the planning area would likely increase pressure for sport fishing. This pressure could lead to an increased incidence of illegal fish introductions for sport fishing and could devastate native fish communities (Minckley and Deacon 1991). The harm to aquatic habitat and wildlife species could

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be negligible to severe, depending on a variety of factors, including the scale, location, type of mine, location of resident miners, and potential for mitigation.

Utility Rights-of-Way and Land Use Authorizations

Adding new utility lines would not interfere with BLM's meeting the aquatic habitat portion of the riparian objective unless the lines expand and have a widespread effect on watershed conditions or encourage increased urbanization in the basin. Utility corridor development could substantially increase sedimentation and runoff under Alternative 1. BLM would discourage utilities from crossing riparian zones, but a major utility could substantially degrade these areas and cause bank instability and sedimentation. Alternative 1 would discourage utilities from crossing the riparian zone, but utilities might still cross riparian and aquatic habitat. Heavy construction equipment and disturbance might slightly to moderately disturb habitats important to federally listed and other fish and aquatic wildlife.

Other infrastructure such as utility lines would facilitate or encourage the development of the basin, which includes thousands of acres of State Trust and private lands. Such development would likely alter hydrologic function (Dunne and Leopold 1995; Naeser and St. John 1996). Cienegas in the basin are fragile wetlands that would likely be disturbed greatly by such changes (Hendrickson and Minckley 1984). Degradation from the corridor itself would be mitigated to the extent possible because of the high value of the resources, including endangered species.

Off-Highway Vehicle Management

Under Alternative 1, limiting off-highway vehicle (OHV) travel to designated roads should help meet the aquatic portion of the riparian objective. This restriction would protect the following:

- Aquatic wildlife from harassment.
- Habitat conditions, especially stream banks, from OHV degradation.
- Habitats important to federally listed and other aquatic wildlife

Road Designations

Under Alternative 1 motor vehicles use 136.7 miles of roads (public and administrative use) under partial implementation of the designated road system. Restricting vehicles to these roads helps meet the aquatic habitat objective.

The 11 fords that cross Cienega Creek are a minor source of sedimentation to the creek. But they are eroding at increasing rates, adding to sedimentation caused by widespread soil piping on abandoned floodplains along Cienega Creek and Mattie Canyon. These crossings provide access for recreation, extend the area of disturbance, and allow ample opportunity for the illegal transport of nonnative fish. The potential impact of these crossings ranges from small adverse impacts from sedimentation and fish injury to the large adverse impact of facilitating the introducing of illegal sport fish.

Arizona Trail

The lack of a designated route for the Arizona Trail under Alternative 1 would not affect fish and aquatic wildlife.

Recreation Management

Although recreation zones are not established under Alternative 1, the aquatic portion of the riparian objective would be met unless recreation use levels rise dramatically. Alternative 1 would degrade stream banks to a limited extent as recreation increases in riparian areas.

Recreation is light in the riparian area along Cienega Creek and Mattie Canyon but is heavy

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enough in upper Empire Gulch to create some trails and light bank damage. As recreation increases in the planning area, visitors would create more hiking trails where roads provide access to riparian areas. The water and shade of riparian areas attract people. Bank and floodplains soils are fragile within the planning area's riparian zones (see BLM 1987c). Trails and bank damage from increasing visitor use are likely to promote erosion and retard the growth of riparian plants on stream banks. This damage would disturb habitat features for fish and aquatic wildlife species in some of the more popular areas. If bank damage becomes extensive, the stream channel would adjust from bank erosion and sedimentation to become wider and more shallow in profile with fewer deep pools (as described in the riparian section above).

The presence of large-pool habitat and the potential for fishing could encourage the illegal stocking of Cienega Creek with sport fish. But the Arizona Game and Fish Commission's closing of Cienega Creek to fishing has diminished this risk. Proper signing of the area would further diminish this risk. Thick vegetation and the muddiness of the creek limit foot traffic across the creek. Trampling along the creek's shallow margins is likely to subject Gila topminnow to a small level of mortality. These risks would become more serious as the area either becomes more popular or as the basin is developed for residential communities, which is the long-term trend (Naeser and St. John 1996).

Livestock Grazing

Under Alternative 1 current livestock management, with limited use of aquatic habitat and the riparian zone by livestock, is increasing the habitat elements important to fish. These elements include woody cover, undercut banks, average pool depth, and overhanging cover.

For about 6 weeks during the summer cattle simultaneously graze and use Cinco Ponds as water points. Cinco Ponds support native leopard frogs, breeding ducks, and rails. Heavy grazing during the summer subjects frogs and tadpoles to decreased cover and water quality. Heavy grazing and bank trampling reduce the quality and quantity of habitats for frogs, ducks, and rails. Sedimentation and accumulation of cattle waste products diminish water quality.

Other impacts to these ponds from grazing can be both harmful and beneficial. On one hand, bank damage would likely result in the filling and widening of these ponds, slowly leading to less open water and more coverage by aquatic plants and speeding their natural progression to wet meadows. This thick vegetation is ideal cover for rails and many other bird species. But grazing of these ponds would directly harm aquatic habitats by reducing the longevity of open water needed to support leopard frogs, ducks, and future fish introductions.

On the other hand, by cropping off large volumes of aquatic plants, grazing can reduce the biomass of plant material deposited annually. This reduction in biomass also opens up some of the ponds that would otherwise have a complete stand of emergent vegetation and provides open water for ducks, fish, and frogs.

Livestock use of six existing crossing lanes on Cienega Creek would harm fish and fish habitat, directly affecting 1,800 linear feet (0.4 acres) of aquatic habitat. Large numbers of cattle crossing the creek are likely to injure small numbers of topminnow and other fish, frogs, and garter snakes. But, overall, harm to fish, frog, snake, and flycatcher populations is expected to be minor.

Indirect effects of livestock using these crossings would include trampling of the soil and the resulting decreased bank stability and lowering of water quality. This impact in turn increases the opportunity for localized water erosion from soil disturbance, which degrades fish habitat by covering food organisms with silt. The intermittent use of these lanes for cattle to cross the creek for pasture rotation in the short term would degrade the 0.4 acres involved.

Livestock are also grazing 2 miles of perennial Cienega Creek every other year during the winter (nongrowing season) only. Riparian condition data show an improving trend and satisfactory condition. Winter use is expected to continue until the reach is fenced to exclude livestock from the riparian area to mitigate most direct impacts of the grazing operation on federally listed fish.

Although fish populations might experience limited short-term harm from the existing livestock grazing plan, livestock grazing is not compromising the overall health of topminnow and Gila chub populations. Species such as the southwestern willow flycatcher, Mexican garter snake, and Chiricahua leopard frog are likely benefitting from increased vegetation density in aquatic habitats under the present grazing regime.
The diminutive Huachuca water umbel, on the other hand, might not be as likely to survive where other aquatic and semiaquatic plants limit exposed soil, light, and nutrients. Likewise, longfin dace would likely become less abundant with the continued loss of open, wide, shallow, sandy habitats to those of well-vegetated marsh or deeper, narrower pool habitats. Cattle do attract and support cowbirds, which lay parasitic eggs in the nests of southwest willow flycatchers and other riparian nesting birds (see terrestrial wildlife section below). This attraction can be considered an adverse impact.

Stock ponds provide an opportunity for the illegal stocking of sport fish and refuges for dispersing bull frogs. These alien fish and frogs threaten native fish and frogs. To mitigate the probability of contaminating stock waters by the public's illegal transplanting of nonnative fishes , these water sources would be supplied with water on a seasonal basis only and would be allowed to dry annually. These "repressos" would dry up naturally in 1 to 3 months after pumping stops.

Only a few stock waters catch rain runoff that allows for extended persistence. Of these, none have perennial surface water. The risk to the fish community in Cienega Creek from developing these waters is small. This aspect of the grazing plan is not likely to harm Gila topminnow, longfin dace, or Gila chub.

Empirita Allotment
The present proposal to exclude grazing at the Narrows on Cienega Creek would provide a high level of protection for Gila topminnow habitat. No catchments that might attract sport fish or bull frogs that could contaminate aquatic habitat with native species are planned for or operated on public land in this allotment.

Vera Earl and Rose Tree Allotments
No catchments that might attract sport fish or bull frogs that could contaminate topminnow sites are planned for or operated on public land in these allotments, and no perennial stream segments are present. Therefore, livestock grazing under Alternative 1 on these allotments would not affect fish and aquatic wildlife.

From Special Designations

Areas of Critical Environmental Concern
See the impacts to riparian resources section. Lack of designation of ACECs in sensitive riparian areas could deny important protective management to fish and aquatic wildlife.

Summary of Alternative 1 Impacts on Fish and Aquatic Wildlife

Alternative 1 could meet the aquatic portion of the riparian objective in the short and long term with few long- or short-term negative impacts. As a result, a host of aquatic wildlife species, plants,

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and rare aquatic habitat types would benefit. BLM would restrict off-highway vehicles and livestock grazing to the point where impacts on aquatic habitat and populations of federally listed fish, frogs, and plants would be limited to the following:

- Cinco Ponds.
- 2 miles of Cienega Creek (until fenced in 2001).
- 1,800 feet of creek within crossing lanes.
- Nogales and Little Nogales springs

Another 1,700 feet of Cienega Creek would be fenced to exclude livestock from the riparian area at the most northerly stream reach.

If use levels greatly increase, recreation could create enough damage to cause widespread and long-term disturbance to stream banks and vegetation, which form the structure of aquatic habitat. Increased recreation and urbanization in the basin could lead to the illegal stocking of Cienega Creek and other waters with nonnative fishes, bull frogs, or crayfish, which would permanently devastate populations of native aquatic animals.

Ultimately, changes in watershed conditions from shrub invasion (as a result of full fire suppression), widespread residential development, or large-scale mining could change aquifer elevations, duration of surface flows, sedimentation, and flood flows. The result would be bank erosion and undesirable changes in riparian and aquatic habitat, which would permanently harm wildlife populations that rely on Cienega Creek and other sensitive aquatic habitat types.

Impacts to Fish and Aquatic Wildlife from Alternative 2

From Desired Resource Conditions

Watershed: Upland, Riparian, and Aquatic Vegetation Management

Implementing a vegetation treatment program would create conditions that help Cienega Creek meet and maintain the aquatic portion of the riparian objective, thereby benefitting federally listed fish and aquatic wildlife and plants. Upland vegetation management would enhance riparian development and channel stability by reducing the prevalence of shrubs. Such management would also increase watershed cover by promoting increased perennial grasses. The fish and aquatic wildlife and plants in Cienega Creek would benefit from a low level of sediment supply that promotes channel stability. Lower sedimentation and higher channel stability would promote habitat development with a diversity of conditions, including the following:

- High levels of instream cover.
- A large range of depths and velocities.
- Riparian canopy cover that lessens seasonal extremes in water temperatures.

Controlled burning might lower water quality for fish and frogs for short periods over limited distances of stream habitat. Precautions such as small burn unit size and sequencing of burn plots over individual sub-basins would make the influx of ash to Cienega Creek unlikely to reach concentrations that would kill fish and wildlife. The influx of sediments from burned areas is not expected to reach levels that would alter aquatic habitat composition and characteristics except when close to the tributary carrying the sediment.

Fire reaching the riparian area might cause a temporary loss over a limited area of cover used by waterfowl such as ducks, snipes, and rails. Fire might also destroy garter snakes, mud turtles, young birds, and eggs. But prescribed fire is likely to inflict only minor harm to wildlife populations and habitat in riparian/aquatic areas.

BLM would design herbicide use to mitigate most potentially harmful impacts to nontarget plants and animals and would further analyze potential impacts in site-specific treatment plans.

Fish and Wildlife Management

Unlike current management, the fish and wildlife management actions common to activity plans for Alternatives 2, 3, and 4 would enhance the ability to restore natural diversity of fish and wildlife. These actions would more emphasize protecting habitat for sensitive aquatic species than would Alternative 1.

Reintroductions or range extensions would conserve aquatic wildlife, including the desert pupfish, Gila topminnow, Gila chub, lowland leopard frog, and Chiricahua leopard frog and improve their chances for long-term survival. If their situation (i.e. security from extinction) improves, candidate species for listing might not need to be listed, or listed species might be down listed.

Securing instream flow water rights would ensure sustainability of surface water in Cienega Creek essential to maintaining habitats and populations of fish and aquatic wildlife. Such animals include Gila topminnow, Gila chub, longfin dace, leopard frog, and Mexican garter snake.

Reintroducing beaver would affect channel geometry and riparian expression in several ways as described for riparian/wetland areas. The result would be enhanced aquatic habitat diversity through increased velocity and depth diversity, especially in dammed back waters. Areas of increased stream temperatures, particularly on stream margins, are likely to improve rearing habitat for young cyprinid minnows and topminnows. Gains in stream temperature will be partially moderated by shading from riparian tree canopy cover.

Visual Resource Management

Visual resource management classes under Alternative 2 would not affect fish and aquatic wildlife.

Cultural Resource Management

Cultural resource management under Alternative 2 would not measurably affect fish and aquatic wildlife and plants. The Empire Ranch headquarters interpretive and educational program could increase public awareness of fish and aquatic wildlife species and habitats. This awareness would likely contribute to increased public support for further constraints on activities that harm native aquatic wildlife in the basin, thus benefitting these species.

From Land Use Allocations

Mineral Development

By eliminating the potential for mining and mineral leasing on public lands in the planning area, Alternative 2 would greatly reduce the risk of habitat degradation from sedimentation, unsustainable water use, and contamination. This action would ultimately improve aquatic habitat quantity and quality from that under Alternative 1. Increased security from habitat-altering land use practices would translate to increased security for populations of federally listed and common fish and aquatic wildlife and plants.

Utility Rights-of-Way and Land Use Authorizations

Alternative 2 would restrict utility rights-of-ways to existing corridors, thereby lessening the risk of

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disturbance from construction and maintenance of new utilities that would occur under Alternative 1. The limits on utility and other right-of-way authorizations would help minimize disturbance to the watershed, riparian area, and aquatic habitat. In addition, BLM would restrict infrastructure in the basin to support development. This restriction would inhibit suburban growth. Such growth would harm aquatic habitats that support fish and aquatic wildlife and plants.

Off-Highway Vehicle Management

Under Alternative 2 off-highway vehicle management would affect fish and aquatic wildlife much as under Alternative 1.

Road Designations

The closing and rehabilitating of all but one road crossing the creek under Alternative 2 would help prevent excessive sedimentation from degrading aquatic habitats. Alternative 2 would present less risk than Alternative 1 of death or injury from vehicles, diminished water quality from vehicle fluids, and contamination of the creek from the illegal transfer of sport fish or other nonnative aquatic animals. Such contaminations would most certainly place the Cienega Creek fish community at risk of being lost and replaced by introduced nonnatives.

Arizona Trail

Under Alternative 2 foot and horse travel would increase along Cienega Creek as the Arizona Trail improves access to remote areas and attracts more visitors to the area. The result would be more impacts of the type described for recreation management.

Recreation Management

Closing or limiting motor traffic access along Cienega Creek would prevent more degrading of habitat from increased sedimentation and bank damage by off-highway vehicles at 11 creek crossings. Foot and horse travel would increase along Cienega Creek as the planning area becomes more well known and recreation use increases. Increased travel is likely to slightly increase injury or death of Gila topminnow, which occupy the shallow margins of the creek in large numbers. This injury and mortality would only negligibly affect the Cienega Creek population of Gila topminnow.

Some curious sightseers would harass, pursue, and capture leopard frogs and Mexican garter snakes. Visitors are also likely to trample some Huachuca water umbels. The level of impact under Alternative 2 would be less than under Alternative 1. Establishing a recreation permit system should help ensure the sustainability of aquatic habitats and populations of aquatic species.

Livestock Grazing

Impacts from livestock grazing management under Alternative 2 would be similar to those under Alternative 1. Livestock use of two additional crossing lanes will disturb an additional 0.1 acre of aquatic habitat. The expanded biological planning process should further help protect aquatic fish and wildlife through increased monitoring and improved watershed condition. Fencing of Nogales and Little Nogales springs would protect these sensitive aquatic habitats from livestock impacts.

From Special Designations

Areas of Critical Environmental Concer[illegible]

ACEC designation would emphasize improving watershed and riparian health. This emphasis would in turn benefit aquatic habitat used by fish and aquatic wildlife and plants. This designation would direct more BLM resources to conserving the planning area's fish and wildlife habitat and benefit fish and aquatic wildlife.

Impacts to Fish and Aquatic Wildlife from Alternative 3

From Desired Resource Conditions

Watershed, Fish and Wildlife, Cultural, and Visual Resource Management
Impacts under Alternative 3 would be the same as under Alternative 2.

From Land Use Allocations

Mineral Development
Impacts under Alternative 3 would be similar to those under Alternative 1 except that they might occur over a much larger area of the watershed. Alternative 3 would protect Cienega Creek, lower Empire Gulch, Cinco Ponds, Mattie Canyon, and Nogales and Little Nogales springs from direct surface disturbance. Upper Empire Gulch would not have the same protection from the direct impacts of mining.

Utility Rights-of-Way and Land Use Authorizations
Impacts under Alternative 3 would be the same as under Alternative 2.

Off-Highway Vehicle Management
Impacts under Alternative 3 would be he same as under Alternative 1.

Road Designations
Road closures and restrictions under Alternative 3 would affect fish and aquatic wildlife and plants much as under Alternative 2 except that under Alternative 3 BLM would close and rehabilitate a smaller acreage of roads.

Arizona Trail
Alternative 3 would locate the Arizona Trail in the riparian area through the Narrows. Recreation levels high enough to allow bank erosion are likely to alter habitat properties, such as a change from narrow, deep pools with cover to wide, shallow pools. Channel adjustments from the trail, if located on the floodplain, would directly harm aquatic habitat, fish, and aquatic wildlife and plants in contrast to Alternative 1, which would not affect these habitats and species. A reduction in deep pool habitats would likely harm Gila chub, leopard frogs, and Sonoran mud turtles, which rely on these habitats. Use of the Arizona Trail could result in the following:

- Injury or death to Gila topminnow.
- Harassment of leopard frogs, Gila chubs, and Mexican garter snakes.
- Damage to vegetation cover.
- Trampling of stream banks.

Recreation Management
Recreation under Alternative 3 would affect fish and aquatic wildlife and plants much as under Alternative 2.

Livestock Grazing
Livestock grazing management under Alternative 3 would affect fish and aquatic wildlife much as under Alternatives 1 and 2 except that watershed condition and function under Alternative 3 might suffer during droughts. This type of grazing management might be translated into adverse effects to the hydrology of Cienega Creek, including increased peak flow from flooding and sedimentation following extended droughts. Alternative 3 is more likely than Alternatives 1 or 2 to have a lasting negative impact over the long term on aquatic habitats, fish, and aquatic wildlife and plants.

From Special Designations

Areas of Critical Environmental Concern
Under Alternative 3 the planning area's ACEC would amount to only 4,859 acres (roughly 10% of

that under Alternatives 2 and 4) but would still cover most aquatic habitats, including Cinco Ponds, lower Empire Gulch, Mattie Canyon, and Nogales and Little Nogales springs. The ecological integrity of upper Empire Gulch would not be protected by ACEC designation and management emphasis. The impact to fish and aquatic wildlife and plants would be more beneficial than under Alternative 1 but not as beneficial as under Alternatives 2 and 4.

Impacts to Fish and Aquatic Wildlife from Alternative 4

From Desired Resource Conditions

Watershed, Fish and Wildlife, Cultural, and Visual Resource Management

Impacts under Alternative 4 would be the same as under Alternative 2.

From Land Use Allocations

Mineral Development

Mineral development under Alternative 4 would affect fish and aquatic wildlife the same as under Alternative 2.

Utility Rights-of-Way and Land Use Authorizations

Utility rights-of-way and land use authorizations under Alternative 4 are less likely to indirectly disturb aquatic habitat than under Alternatives 1, 2 and 3 because Alternative 4 would designate only one utility corridor. Watershed disturbances would only slightly affect fish habitat by causing increased sedimentation and runoff, especially if construction disturbance is mitigated. The designation and later use of this single utility corridor are likely to slightly harm federally listed or common fish and aquatic wildlife and plants.

Off-Highway Vehicle Management

Impacts under Alternative 4 would be the same as under Alternative 1.

Road Designations

Road closures and restrictions under Alternative 4 would affect fish and aquatic wildlife and plants much as under Alternative 2.

Arizona Trail

The Arizona Trail under Alternative 4 would affect fish and aquatic wildlife and plants much as under Alternative 2.

Recreation Management

Recreation under Alternative 4 would affect fish and aquatic wildlife and plants much as under Alternative 2.

Livestock Grazing

Under Alternative 4 the crossing lanes for livestock management would no longer disturb 1,800 linear feet of aquatic habitat (less than 0.5 acre). Large numbers of cattle would no longer cross Cienega Creek and pose a small risk of injury to fish, frogs, garter snakes, and the Huachuca water umbel. Fish and aquatic wildlife and plants are expected to benefit only slightly more than under the other alternatives because most of Cienega Creek is already excluded from livestock grazing and the rest of the creek is scheduled to be fenced this year.

Most stock ponds would be retired or converted to wildlife use. To mitigate the probability of contamination of stock waters by illegal transplants of nonnative fishes and frogs by the public, water sources retained for wildlife or recreation use would still be supplied with water only seasonally and would be allowed to dry annually. These "repressos" would dry up naturally in 1 to 3 months after the pumping is stopped.

Upland vegetation management would promote a high level of channel stability, which would enhance cienega-type riparian development. Upland vegetation management would reduce the prevalence of shrubs and increase watershed cover by promoting an increase in perennial grasses.

Without livestock grazing, ecological sites would likely meet their potential for plant community composition and production sooner and more often than with livestock grazing. All of the alternatives for grazing management are likely to promote habitat development with a diversity of conditions, including the following:

- High levels of instream cover.
- A large range of depths and velocities.
- Riparian canopy cover that ameliorates seasonal extremes in water temperatures.

Alternative 4 is likely to benefit habitat development with the least environmental risk of the problems of livestock control (e.g. fences and gates) and operator compliance (e.g. rotating pastures on time). But the gains on public lands are likely to be offset by reductions in watershed conditions from traditional grazing practices or large reductions in watershed conditions from conversion of private ranches and State Trust Land to urban development (see cumulative impacts to watersheds and riparian/wetland areas).

From Special Designations

Areas of Critical Environmental Concern
ACEC management under Alternative 4 would affect fish and aquatic wildlife as under Alternative 2.

Impacts to Terrestrial Wildlife (Including Threatened and Endangered Species)

Scope of Analysis: This section uses changes in habitat features and populations of terrestrial wildlife to compare the impacts of the alternatives on terrestrial wildlife.

Impacts to Terrestrial Wildlife from Alternative 1 (Current Management)

From Desired Resource Conditions

Watershed: Upland, Riparian, and Aquatic Vegetation Management
Alternative 1 would make no concerted efforts to treat upland vegetation. In the long term shrub cover would increase in the upland sites, and perennial grasses would decrease. Some portion of open grassland communities would change over time to a mesquite/shrub woodland with grass understory. Less open grassland habitat would exist for grassland wildlife species (such as pronghorn, Baird's sparrow, scaled quail). Species that prefer more shrub and tree cover (white-tailed deer, mule deer, Gambel's quail, Cooper's hawk, Bell's vireo) would have more habitat.

Fish and Wildlife Management
Current fish and wildlife management includes consultations with the U.S. Fish and Wildlife Service to reduce adverse impacts on endangered or threatened species and coordination with the Arizona Game and Fish Department to minimize impacts to fish and wildlife from land use authorizations and projects.

Studies, habitat improvements, and reestablishing terrestrial wildlife could potentially improve the viability of wildlife populations and habitat values on public lands. For example, a study of pronghorn home range could document the amount of grassland habitat needed to sustain the local pronghorn herd. If applied, this knowledge could result in the acquisition from willing sellers—through purchase, easement, or other means—of more grassland and could help maintain pronghorn herds in the planning area.

Visual Resource Management
Alternative 1 would retain visual resource management (VRM) Class III for the planning area. This VRM classification is not expected to reduce the value or amount of upland habitats or reduce the viability of wildlife populations. Stipulations to ensure conformance with VRM Class III could slightly increase costs of habitat improvement projects.

Cultural Resource Management
Under Alternative 1 BLM would survey cultural resources as needed and stabilize or preserve historic buildings. Cultural resource survey, preservation, or stabilization would disturb about 2 acres of upland habitats in the planning area. This level of habitat disturbance would not noticeably reduce upland wildlife habitat use, habitat quality, or population viability.

From Land Use Allocations

Mineral Development
Under Alternative 1 a total of 458 acres of desert scrub, disclimax grassland, and oak woodland habitat in the Empire Mountains would remain open to locatable and leaseable mineral development. The entire area would be closed to salable mineral development. An unknown number of mines might be developed under Alternative 1. The extraction of locatable or leasable minerals would disturb the ground surface. Wildlife habitat loss and degradation would result from the following activities:

- Clearing vegetation and topsoil for pits, stockpiles, roads, ancillary facilities, storage sheds, offices, housing, parking, and loading areas.

- Excavating mineral materials, gravel, and rock.

- Stockpiling mineral material, ore, leaching piles, and overburden.

- Clearing habitat and installing trailers, storage areas, mills, equipment yards, material depots, refuse piles, fueling areas, and separation areas.

Mining of locatable or leasable minerals under Alternative 1 would degrade or eliminate an undetermined amount of oak woodland habitat for such species as Mearn's quail, white-tailed deer, and alligator lizard. Mining would also disturb some agave–which grows in scattered clumps in both woodland and grassland–and might harm the endangered lesser long-nosed bat, which feeds on nectar and pollen from agave blossoms.

The excavation, surface disturbance, and vehicle traffic from mineral development accidentally kill reptiles, especially slow-moving species such as western box turtles, rattlesnakes, and Gila monsters. This mortality could result in long-term declines in reptile populations when combined with mortality from disease and predation.

Under Alternative 1 mineral extraction would disrupt wildlife use. Mining often creates noise and dust and results in vehicle traffic and human presence, all of which scare away large wildlife species such as pronghorn, deer, and javelina. Ockenfels and others (1994) found that pronghorn tend to avoid habitat within 1 kilometer (0.6 mile) of maintained roads. De Vos and others (1984) found that mule deer avoid habitat within 400 meters (0.25 mile) of human intrusions. From these studies one can reasonably conclude that large ungulate species would avoid an area within a half mile or more of a mine.

Mine access roads would encourage increased incidents of poaching by improving access to a given area. Poaching can be a significant source of mortality and could lead to long-term population declines, reducing the carrying capacity of otherwise suitable habitat. Impacts of poaching are described in more detail in the off-highway vehicle section below.

Alternative 1 would subject only a small portion of the planning area to the negative impacts discussed above. About 48,542 acres would remain closed to mineral development and would not be subjected to the above-mentioned impacts.

Utility Rights-of-Way and Land Use Authorizations

Alternative 1 would designate no right-of-way corridors within the planning area. As a result, utilities could propose rights-of-way for almost any area if the rights-of-way would not conflict with threatened or endangered species or sensitive cultural resources. BLM might grant rights-of-way that would significantly disturb wildlife over the long term.

Construction along rights-of-way and at communication sites disturbs the ground surface and destroys native wildlife habitats. Surface disturbance allows for potential colonization by nonnative plants and animals, such as Lehmann's lovegrass, Johnson grass, starlings, and house sparrows. These species might outcompete native plants and wildlife and reduce species diversity in the long term.

Visitors tend to adopt rights-of-way and communication site roads as recreation travel routes. These roads also become areas accessible for poaching, off-road vehicle use, and other unauthorized activities. Such rights-of-way and land use authorizations could have impacts of the type described for mining roads and off-highway vehicles.

Off-Highway Vehicle Management

Alternative 1 would allow public motor vehicle use on 116.4 miles of road. Throughout the planning area levels of recreation use would be high and likely to harm wildlife and habitat

Vehicle-based recreation disturbs wildlife. Such recreation often involves noise, vehicle traffic, and the presence of visitors and their dogs, all of which scare large wildlife species, such as white-tailed deer and javelina, away from the disturbed area. These species often reduce their use of an area surrounding recreational activities, especially those involving large numbers of people or pets.

Increased vehicle traffic—both authorized on-road use and unauthorized off-road use—would accidentally kill animals, especially slow-moving reptiles such as western box turtles, rattlesnakes, and Gila monsters, and other nongame species. When combined with death from other sources such as disease and predation, this mortality could cause long-term declines in reptile populations.

Road access would also increase incidents of poaching. Roads increase the access to a given area and the likelihood of poaching. Large mammals are more easily poached, especially at night (Connolly 1981), and reptiles are more easily illegally collected in areas accessible by road. Brittell and Pierce (1984) found that almost 50% of mortality of radio-collared mountain lion was due to unregulated killing (including poaching) in Washington. Pursley (1977) estimated that the take of mule deer in New Mexico during closed season was 34,000–about the same as taken by legal harvest. This source of mortality could be significant and could lead to long-term population declines and reduce the carrying capacity of otherwise suitable habitat.

Unauthorized off-road travel by recreational users under Alternative 1 would disturb vegetation cover. Such users would leave roadways to retrieve downed game, explore new areas, or gain access to hilltops for better views or campsites. Once one vehicle travels through an area, the tracks become a visible path for future use. Over time a new "wildcat" road becomes established in a previously roadless area. This process inevitably occurs where roads are present roughly in direct proportion to the level of recreation use.
The unauthorized off-road travel and resultant road establishment would disturb stands of agave, which grow in open grasslands. Vehicles driving over plants and compacting soil would reduce the density of these plants and indirectly harm the endangered lesser long-nosed bat, which feeds upon the nectar and pollen of the flowering agaves.

Other indirect impacts of the roads consist of human presence and vehicle traffic, which kill other nongame wildlife as well. This mortality can take several forms. All forms of wildlife, especially slow-moving species such as western box turtles, rattlesnakes, and Gila monsters, can suffer mortality from accidental crushing by passing vehicles. Rattlesnakes and Gila monsters and other species are exposed to deliberate killing when found by motorists who fear or loath reptiles, especially venomous ones.

Some species of reptiles are considered valuable and captured for the illegal pet trade. This collection removes these individuals from the breeding population and constitutes effective, if not actual, mortality. Though not the problem of decades ago, hawks, vultures, and other protected avian species are still subject to shooting (Muth and Bowe 1998). These sources of mortality, all road related, could cause long-term declines in wildlife populations when combined with mortality from other sources such as disease and predation.

Road Designations

Alternative 1 would keep 116.4 miles of road open to recreational use and impose only a few road closures or restrictions. High levels of recreation use throughout the planning area could be expected. The impacts would be as described in the off-highway vehicle designation section, above.

Arizona Trail

Alternative 1 would not designate a route for the Arizona Trail across the planning area, and the trail would not affect wildlife resources.

Recreation Management

The lack of designation of recreation zones, would result in dispersed recreation throughout the planning area. Because all-terrain vehicles and other off-road and four-wheel drive vehicles could access the entire area, the impacts would be as previously discussed in the off-highway vehicle designation section above.

Because BLM would build no designated camp areas or group sites, Alternative 1 would not have the impacts of concentrated use associated with such developments (which are discussed for Alternatives 2, 3, and 4 later in this chapter). Visitors would still engage in dispersed recreation throughout the planning area. The impacts of this dispersed recreation are described in the off-highway vehicle designation section, above.

Livestock Grazing Management

The vegetation consumed by livestock as forage represents a loss of potential cover and forage for wildlife in the planning area. Many factors influence the relative impact to wildlife species and habitats from this vegetation consumption. The amount of vegetation available in any year is determined largely by rainfall amounts and patterns. Cattle can consume differing percentages of the available forage, depending on many variables including stocking rates, pasture rotation, season, and types of forage.

Utilization is another important factor. Utilization relates to the vertical cover (height) of vegetation removed, but utilization is usually unevenly distributed across the landscape due to livestock movement patterns and preferences for certain areas. Utilization is usually an average of the use in a pasture, and some areas in a pasture might have greater utilization than other areas. If livestock are on a rotational system and plants are grazed only once in a growing season, the plants can regrow after cattle are moved out, thereby ensuring cover would remain for watershed and wildlife. But repeatedly using plants in one growing season would affect the reserves the plant has for growth in the next growing season as well as the amount of standing cover that remains.

Another important factor is the dietary overlap (similarity in plants consumed) among livestock and wildlife species. This overlap represents the degree of competition between cattle and wildlife for forage plants. Cattle often prefer certain species of plants over others and might reduce the relative abundance of preferred species in an area. When the nutritional value of forage is low, cattle might consume up to twice as much to obtain the nutrients they need (SCS 1976).

Alternative 1 would permit livestock grazing on 41,855 acres of grassland and oak woodland habitats on public land. Since these cattle would graze on State Trust Lands or private lands during portions of the year, the number of livestock on public land at any one time would vary widely from 832 cattle (maximum allowable stocking rate on public land) to perhaps 400. If all allotments were stocked at the maximum allowable rate on public lands during a high rainfall year, livestock would consume 8 million pounds of forage, representing about 46% of the available forage on public land (Chapter 2, Table 2-13). The same number of livestock would consume 68% of the available forage during a normal rainfall year and all available forage during a low rainfall year.

Under Alternative 1 livestock would graze 64,649 acres of grassland and woodland habitat on State Trust Lands. The maximum stocking rate on State Trust Lands in the planning area is 13,776 animal unit months (or 1,148 cattle per year). The 1,148 cattle would consume 11 million pounds of forage or 41% of the available forage on State Trust Lands during a high rainfall year. The same number of livestock would consume 61% of the available forage during a normal rainfall year and 92% of the available forage during a low rainfall year.

For all allotments and land ownership combined, the maximum stocking rate is 2,064 cattle, which would consume 19.8 million pounds of forage annually and represents 44% of the total available forage during a favorable year on allotments in the planning area. If livestock numbers were held at the maximum stocking rate during a normal rainfall year, livestock would consume 66% of the available forage. During an unfavorable rainfall year livestock held at the maximum stocking rate would consume 100% of the available forage.

But if livestock operators continue to adjust numbers on the Empire-Cienega allotment as they have done in the past based on input from the Biological Planning Team, the percent available forage consumed would stay fairly constant on the allotment (Chapter 2, Table 2-14). In a favorable year, 1,436 cattle on the Empire-Cienega allotment would consume 13.8 million pounds of forage, representing 41% of the available forage. In a normal year, 1,037 cattle would consume 10 million pounds of forage, representing 45% of the available forage. In an unfavorable year, 662 cattle would consume 6.4 million pounds of forage, representing 44% of the available forage. Because the Empire-Cienega allotment represents 68% of the planning area's grazed acreage, adjustments in stocking rate on this allotment significantly affect overall stocking rates and corresponding vegetation conditions in the planning area.

These figures account only for the vegetation consumed by livestock. Trampling would also reduce vegetation cover. Livestock usually trample areas around reservoirs, springs, creek crossings, corrals, and other sites where they concentrate. The acreage of trampled habitat around each watering point can vary, but a zone of overuse of 1/4 mile radius around each water is a conservative estimate. Using the formula for calculating the area of a circle (π times radius squared (πr^2) or 3.141 x 0.06) each watering point would result in 0.2 mi^2 of disturbance or about 122 acres of heavily disturbed ground. For 30 earthen reservoirs, trampling would disturb 3,660 acres (5.7 mi^2) spread out over the allotments.

Livestock grazing could affect wildlife more during years of below-normal rainfall (six times between 1988 and 1997). The degree of impacts depend on the timing and extent of reductions in livestock numbers during drought. The impact of livestock grazing could be less during years of above-normal precipitation (three times between 1988 and 1997 as measured at the Empire west pasture Agricultural Research Service rain gauge).

Under Alternative 1 livestock would graze most grassland habitats, reducing cover or forage for grassland wildlife species such as Baird's sparrow, pronghorn, and grasshopper sparrow. If more than 50% ground cover is removed, which could occur at the upper end of current utilization limit of 40-60%, habitat conditions would improve for species that benefit from increased bare ground, such as horned larks, jackrabbits, and meadow larks.

The standing cover (stubble height) is an important factor for many of the grassland species. Measures of livestock use by percent utilization by weight fail to adequately measure standing cover, and current management has not made other standing cover measurements.

Livestock would also graze most oak woodland habitats, reducing habitat components, mainly cover, for such species as Mearn's quail, white-tailed deer, and bunchgrass lizard.

Studies have found that the density of bunchgrass lizards is up to 10 times higher in ungrazed than in grazed areas (Bock and others 1990). Ballinger and Congdon (1996) documented the elimination of bunchgrass lizard populations in severe cases of grazing. Although heavy grazing can increase *Oxalis* sp.—a plant whose bulbs are preferred by Mearn's quail—livestock grazing that removes more than 55% by weight of available forage can eliminate local quail populations (Brown, R. 1982). Livestock utilization of 46-50% by weight appears to create habitat conditions that are marginal for maintaining quail populations. This utilization could occur in some areas under the current utilization limit of 40-60%.

Studies in the nearby Santa Rita Mountains showed that white-tailed deer use declined steadily with increasing livestock utilization (Brown, M. 1984). In most vegetation associations, deer use (as measured by pellet group counts) declined to near zero as Brown's "cattle index" (the square root of the cattle fecal count) approached 18. This decline might be due to forage competition, shifts in plant composition, or some combination of the two factors caused by livestock grazing. Although only a minor part of white-tailed deer diet, grass is a major cover component.

In another study, heavy livestock grazing before fawning reduced cover for newborn fawns and could increase vulnerability to predation (Ockenfels and others 1991). Heavy use by large numbers of livestock, combined with lower than normal

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rainfall, would probably result in poor physical condition of does and in reduced reproduction (Smith 1984). Continuing current livestock management where stocking rates are varied in response to annual vegetation production and vigor would tend to reduce these impacts.

Some livestock would consume growing agave stalks–found in scattered clumps in both woodlands and grasslands under Alternative 1. Agave are a major food source for the lesser long-nosed bat.

On the Empire-Cienega allotment the variability of the grazing system varies the degree of this impact. Mature agave (which flower only once) produce flower stalks in the spring and early summer. In the early stages the growth points (which are highly edible) are accessible to grazing animals. Livestock mainly graze the loamy hills (the main ecological sites producing agave) in winter before agave produce stalks or in late summer after stalks have grown to an inaccessible height. During the spring most livestock on the Empire-Cienega allotment usually graze the loamy bottom ecological sites (sacaton bottoms with few agave), greatly reducing their consumption of agave growth points.

But during spring livestock operations often use the loamy hills as bull pastures, so bulls may be grazing stalks on these ecological sites. The U.S. Fish and Wildlife Service Biological Opinion for the Cienega Creek Interim Grazing Plan lists studies of livestock use of agave as a nonbinding conservation recommendation (FWS 1996). Under current management with minimal monitoring, BLM has not begun or proposed this study.

Under current management BLM has excluded 659 acres of Cienega Creek and Empire Gulch from livestock grazing, including most riparian areas on public land. The Riparian Area Condition and Evaluation (RACE) monitoring completed in 2000 found about 12.5 miles of the riparian area in satisfactory condition and 1.6 miles in unsatisfactory condition (see Chapter 3, Riparian Area Condition). Cattle still have access to small amounts of riparian area at crossing lanes and in portions of Empire Gulch, Gardner Canyon, Cinco Ponds, the Narrows on Cienega Creek, and at Nogales Springs.

The remainder of Cienega Creek is scheduled to be fenced from livestock except for six existing crossing lanes that include about 4 acres of riparian habitat. In these areas, cattle would forage on riparian vegetation, consuming and trampling seedling trees and shrubs. The result would be a loss of cover and structural diversity of woody riparian trees in small areas.

Suitable habitat for the endangered willow flycatcher is present in Cienega Creek (see Chapter 3, Special Status Species Habitat). No nesting flycatchers have been recorded in the area, but the area has not been thoroughly surveyed. The crossing lanes and other areas open to grazing might fragment the habitat and affect its suitability for southwestern willow flycatcher. Use of the lanes as described above could degrade about 4 acres of suitable habitat within or next to the crossing lanes.

Within 2-3 years of excluding livestock from the previously grazed riparian areas, suitable willow-flycatcher habitat is generally created. But over time, areas excluded from grazing for several years also lose habitat potential as the trees begin to age. Density of cover in the 1- to 6-foot height declines as the Goodding willow and Fremont cottonwoods age. Disturbance such as periodic floods and historical wildfires opened up these areas and created new habitat patches. With wildfires suppressed, more active management might be needed to maintain extensive areas of suitable habitat in this relatively stable system.

Some of the 14 planned livestock developments (stock ponds) would be placed within 4 miles of riparian areas. These facilities provide improved foraging habitat (in the form of bare ground with manure and weed seeds) for mourning doves, starlings, house sparrows, and brown-headed cowbirds. The brown-headed cowbird is a nest parasite of the southwestern willow flycatcher, Bell's vireo, yellow warbler, and other song birds. Cowbird nest parasitism of the southwestern willow flycatcher and other species might increase due to the proposed waters next to Cienega Creek. Cowbirds have been shown to fly up to 4 miles from feeding areas to engage in nest parasitism (Robinson and others 1995). Cowbirds would likely be present in the planning area regardless of livestock grazing on public lands because of the closeness of residential areas and horse facilities on private land.

Most roads in the planning area were originally built and maintained to service livestock management facilities (wells, pumps, corrals, fences, housing for ranch workers, and other facilities). These roads are also open to the public and are used by visitors. The impacts on wildlife from use of these roads have previously been described under off-highway vehicle impacts and impacts of roads for mineral development.

Alternative 1 proposes 21.5 miles of fence for livestock control. This fencing should not restrict movement of pronghorn, mule deer, and white-tailed deer, particularly deer fawns because BLM fences are designed to allow passage by these species.

Decisions on livestock management and stocking rates for the Empire-Cienega allotment (the planning area's largest) have been made and would continue to be made with input from a Biological Planning Team under Alternative 1. Current levels of vegetation and watershed monitoring and analysis would continue under this alternative. BLM has conducted limited monitoring and analysis of wildlife species and habitat components (mainly for grassland sparrow habitat and endangered species) and would continue to do so.

The biological planning process has been used on the Empire-Cienega allotment since 1994 and has produced many changes in the management of the livestock operation. The grazing permittee first proposed this process and has voluntarily implemented almost all recommendations developed through it, including the following:

- Leaving more cover for sparrows and pronghorn, which use grassland sites on the south end of the ranch.
- Fencing most of the riparian habitat along Cienega Creek, Mattie Canyon, and Empire Gulch.
- Pumping water for pronghorn and other wildlife.

The ability of the Biological Planning Team under Alternative 1 to recommend effective livestock management changes that benefit wildlife is constrained by the limited amount of monitoring data being collected and the need to integrate the impacts of other resource uses.

From Special Designations

Areas of Critical Environmental Concern

Alternative 1 would designate no areas of critical environmental concern. Hence, the impacts of grazing, mining, recreation, rights-of-way, vegetation treatments, and fire management on wildlife would be the same as those described in the preceding Alternative 1 impact discussions.

Cumulative Impacts to Terrestrial Wildlife from Alternative 1

Species inhabiting oak woodland habitats, such as Mearn's quail, white-tailed deer, and bunchgrass lizard, would be subject to similar pressures from increased development and management on surrounding and intermixed lands. Unlike pronghorn, white-tailed deer are somewhat compatible with high levels of human disturbance and would probably persist over the long term.

Increased development and management on surrounding and intermixed lands would constrict and eventually cut off movement corridors between mountain ranges, harming wide-ranging species such as jaguar, mountain lion, black bear, and Gould's turkey, and dispersing individuals of other species such as bobcat, coati, and porcupine. Black bear, for example, might at first be attracted to humans because of refuse, bird food, and pet food. As these human-bear encounters increase from nuisance to dangerous levels, bears would be subject to lethal controls or removal. Such actions might reduce populations and eliminate bears from portions of their former range. This process has occurred recently in the Huachuca and Santa Catalina mountains, where humans are rapidly encroaching.

Under Alternative 1, the southwestern willow flycatcher would continue to use the riparian habitat along Cienega Creek during migration. This area has been documented as an important migratory stopover for many neotropical migratory bird species (Krueper 2000). Although none have been documented as breeding within the planning area, willow flycatchers are highly opportunistic. Birds breeding 40-50 miles away could colonize the area (Krueper 2000).

Under Alternative 1 the likelihood of achieving the wildlife objectives would not be high because sufficient movement corridors might not remain to permit the maintenance of biological diversity desired in the objective. The high levels of human use likely under this alternative might increase the difficulty of successful recovery and reestablishing of species. Maintaining viability of priority wildlife species populations would also not be certain.

Several adjustments in livestock management might also be needed to maintain the levels of vegetation cover desired in the objectives. Without monitoring data to support these adjustments, the needed modifications might never be made.

Impacts to Terrestrial Wildlife from Alternative 2

From Desired Resource Conditions

Watershed: Upland, Riparian, and Aquatic Vegetation Management

Activity plans for Alternatives 2, 3, and 4 prescribe integrated vegetation treatment for the Empire-Cienega and Empirita allotments to reduce the density of mesquite, sandpaper bush, catclaw, burroweed, and shrub species. Vegetation treatments would affect wildlife in both the long and short terms.

Areas treated with prescribed fire would temporarily lose vegetation cover and therefore habitat for species previously occupying the area. Fire would also kill some wildlife, particularly slow-moving species such as reptiles.

Antelope might benefit temporarily from new growth following prescribed fire if these fires burn in the southern portion of the Empire Ranch. Prescribed fires in the northern portion of the Empire Ranch or in the Empirita Ranch would not benefit antelope because the topography in those areas is too eroded and rugged to support this species.

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Prescribed fire would destroy some agave. BLM would consult with the U.S. Fish and Wildlife Service (under Section 7 of the Endangered Species Act) for any project-level prescribed fire plans which adversely affect listed species or critical habitat. If any goats or sheep were used for biological control, they would compete for forage with mule deer and white-tailed deer (BLM 1991). Habitat quality for ungulates (hoofed mammals) could decline.

It is uncertain to what extent vegetation treatments would restore desired grassland communities. In some areas, enough topsoil may not remain to permit native grasses to recolonize to densities of a climax grassland community, especially on limey slopes and uplands. Control of dense mesquite stands on the Santa Rita Experimental Range did significantly increase perennial grasses (McCormick 1975). Research by W. Whitford in New Mexico also suggests that mesquite colonization is largely irreversible (Cordery 2000). The ecological chain of events that led to mesquite invasion in the Southwest is complex (Pinkava 1999). Mesquite is a native plant, well adapted to the region, and cattle are major consumers of mesquite pods and dispersers of seed (Pinkava 1999).

The decrease in mesquite and shrub cover on the 20,000 treatment acres, resulting from the combination of vegetation treatments, would reduce occupation of treated areas by species that favor dense cover usually found in mesquite or desert shrub habitat. Cover would decline for such species as bunchgrass lizard, desert spiny lizard, Abert's towhee, Bell's vireo, Lucy's warbler, and Cooper's hawk. Use of the treated areas by dove, Gambel's quail, cottontail, mule deer, and white-tailed deer would decrease (BLM 1991).

These treatments would tend to favor species that prefer open habitats. Such species include vesper sparrow, Cassin's sparrow (BLM 1991), horned larks, and meadow larks. Species such as Baird's sparrow and grasshopper sparrow would benefit from conversion to more open grassland habitat. But grazing rest must be long enough (at least 2 years) to allow for significant increases in native grass cover (BLM 1991). If nonnative species (such as Lehmann lovegrass) increase as a result of the treatments, then Baird's sparrow and grasshopper sparrow would not benefit.

The removal of livestock from most of the riparian area of Cienega Creek and its tributaries has improved riparian conditions and allowed most areas to return to proper functioning condition (see Chapter 3, Riparian Area Condition). Localized impacts from cattle crossing lanes and watering areas would continue to include the following:

- Soil compaction of stream banks.
- Reduced stream bank cover.
- Reduced tree and shrub density.
- Reduced wildlife species diversity at watering areas and other sites where grazing is allowed as described under Alternative 1.

Limiting livestock grazing in riparian zones or using livestock grazing in riparian areas as a management tool would affect wildlife and wildlife habitat. Time lags in detecting the overuse of these areas could result in unacceptable levels of impacts. Impacts in acres of riparian habitat, stream miles, or the degree of wildlife impacts would depend upon the specific project proposal. BLM would complete environmental analyses for projects and consult with the U.S. Fish and Wildlife Service for any projects that might affect federally listed or proposed species or critical habitat.

BLM would reduce the loss of riparian vegetation and wildlife cover, especially for riparian birds, by

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the following actions:

- Restricting motor vehicles to designated crossings.
- Limiting camping.
- Prohibiting gold panning.
- Banning wood cutting.
- Limiting range and recreation developments.

Most of the riparian zone along Cienega Creek is in satisfactory condition with stream bank stability above 75%. Ensuring that activities do not cause bank stability to drop below 90% would improve the protection of riparian areas and wildlife habitats.

Through the biological planning process and by applying the Arizona Standards for Rangeland Health and Guidelines for Grazing Administration, BLM could analyze proposed activities and recommend how to eliminate these impacts. If these recommendations are followed, then stream bank stability would not decline and no riparian habitat would be lost.

Potential positive impacts include small improvements in stream bank cover on specific sites. The nature and degree of impacts on wildlife habitat and species would depend upon the proposals and actions related to these measures.

Fish and Wildlife Management

The impacts of proposals to consider reintroductions, range extensions, and supplementing populations of selected wildlife species (aplomado falcon, Gould's turkey, beaver, black-tailed prairie dog, pronghorn) would depend on the following:

- Results of habitat suitability assessments.
- Public input.
- Agency commitment.
- Funding availability.
- Other factors.

Enough quality habitat might not exist to support viable populations of some of these species within the planning area. Some species, such as Gould's turkey, might require movement corridors to nearby mountain ranges. The constriction of these movement routes by human intrusion and development might greatly curtail the planning area's ability to support this species. Public attitudes might be hostile to reestablishing species extirpated due to conflicts with agriculture, such as the prairie dog. Hence we cannot now adequately analyze the impact of this measure. Populations could be reestablished or expanded to benefit the wildlife species in question only if all of the following conditions are met:

- Evaluations and public attitudes are positive.
- Habitat quality and quantity are suitable.
- Special needs of a given species (such as for movement corridors and migration resting points) are met.
- Needed funding can be obtained.
- Agencies cooperate.

Not enough quality habitat might exist on public land to support a viable pronghorn population over the long term. Until this habitat is evaluated, we cannot evaluate the impact of this measure. Pronghorn herds have been known to persist in spite of human intrusions (Ockenfels and others 1994). Habitat can be suddenly lost due to

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constraints in movement routes between core habitat areas. Such a loss is suspected to have occurred already in the Sonoita area where new homes and fences are being built.

Managing for a mosaic of priority habitats could improve habitat for pronghorn, Baird's sparrow, grasshopper sparrow, Botteri's sparrow, and other terrestrial species. Potentially, habitat values could increase on public lands for species that depend on the priority habitat. If habitat does not improve, monitoring could provide clues as to corrective actions. BLM could then act to create the desired mosaic.

If it fully implements all actions proposed for pronghorn, BLM might be able to maintain a small but viable population of pronghorn on public land.

Actions to improve wildlife habitat by reducing habitat fragmentation would benefit wildlife. Enough actions might provide movement or dispersal corridors between the Santa Rita and Whetstone mountains for large mammals, including mountain lion, black bear, white-tailed deer, and other wide-ranging species. From time to time Gould's turkey might be able to travel along riparian corridors and use woodland habitats in the planning area.

But these efforts might not succeed with increased recreation. The creation of the off-highway vehicle (OHV) staging area and designated OHV trail along Oak Tree Canyon on national forest lands to the west of the planning area have increased human activity. Because ungulates and other wide-ranging wildlife tend to avoid the noise and disturbance created where many vehicles and visitors gather, Oak Tree Canyon is probably no longer suitable as a wildlife movement corridor.

Cultural Resource Management

Cultural resource management, mostly centered on the Empire Ranch headquarters, would slightly harm wildlife. More intensive use of the headquarters area could scare off large wildlife species, such as white-tailed deer and javelina. The area's planning and development would need to be sensitive to wildlife along Empire Gulch. Empire Gulch has high densities of nesting raptors and is often used by a variety of nongame and big game. The headquarters area could focus educational and interpretative themes on these and other wildlife. Such themes could increase public awareness of the planning area's wildlife issues.

From Land Use Allocations

Mineral Development

Under Alternative 2, no locatable or leasable mineral extraction would disturb the surface, and none of the mineral development impacts described for Alternative 1 should occur. Lack of mineral development would benefit the grassland or oak woodland habitats and associated species such as Baird's sparrow, pronghorn, grasshopper sparrow, bunchgrass lizard, Mearn's quail, white-tailed deer, and alligator lizard. Mineral extraction would not disturb agave or affect the lesser long-nosed bat, which forages on nectar and pollen from agave blossoms. By closing the remainder of the planning area to mining, Alternative 2 would not affect wildlife activity patterns, and impacts from new access routes described for Alternative 1 would not occur.

Utility Rights-of-Way and Land Use Authorizations

Alternative 2 would designate two rights-of-way along preexisting routes. Developing rights-of-way would somewhat reduce cover for wildlife. Clearing wildlife cover to install towers, access roads, and construction staging areas would reduce the cover of trees, shrubs, and grasses near the route. Vegetation cover might not return to its previous condition because recreation users typically adopt these routes for travel and the right-of-way holder would periodically clear vegetation during right-of-way maintenance. Wildlife cover would decline on 180 acres.

Stands of agave, the plant that provides nectar and pollen for the lesser long-nosed bat, could grow in the path of new utility lines. Clearing of the utility lines could locally reduce agave density and affect this bat species. But BLM could stipulate avoidance of agave during the building of a utility line and enforce avoidance through the permitting process. Sometimes agaves can be replanted outside the path of construction to reduce losses.

The impacts of other land use authorizations would depend upon the nature and extent of the land use. No analysis can be performed at this time, but analysis would need to be done in site-specific environmental assessments.

The impacts of roads, which invariably occupy rights-of-way, have been discussed in previous sections on mineral development and off-highway vehicle management. These impacts, including vegetation loss, wildlife disturbance, poaching, and other wildlife deaths related to vehicles, would be somewhat less under Alternative 2 than under Alternative 1.

Off-Highway Vehicle Management

Limiting vehicles to designated roads would reduce road-related wildlife harm, which is discussed under Alternative 1. Visitor use to the Empire-Cienega Planning Area might increase under Alternatives 2, 3, and 4 due to the following actions:

- Promoting and enhancing motor vehicle access.
- Acquiring rights-of-way.
- Designating and maintaining roads and trails.
- Identifying access.
- Converting some motorized routes to nonmotorized routes to create a mix of routes.

Because more people would use the planning area for motorized travel and other forms of recreation, the following indirect impacts to wildlife are expected:

- Vehicle-based recreation would disturb wildlife as described for Alternative 1 but over a smaller area because Alternative 2 would close more roads than would Alternative 1 and convert other roads to nonmotorized use, as described below.
- Implementing a designated road system would increase authorized on-road traffic and decrease unauthorized off-road traffic. More vehicles on roads might increase the accidental killing of reptiles, especially slow-moving species such as western box turtles, rattlesnakes, and Gila monsters. When combined with deaths from other sources such as disease and predators, these deaths could cause long-term declines in reptile populations.
- Improved road access in some areas would increase poaching, allowing poachers to more easily take large mammals and illegally collect reptiles in areas accessible by road. This source of mortality could lead to long-term population declines and reduce the effective carrying capacity of otherwise suitable habitat. But proposed road closures and restrictions might offset these increases.
- Implementing a designated road system would reduce the disturbance of vegetation cover by allowing BLM to more easily detect and close unauthorized or wildcat roads. Impacts of unauthorized off-road travel have been described for Alternative 1.

- The actions to improve access might foster an increase in recreation use along riparian areas, favored as picnic and camping sites by vehicle-based users. Recreation would reduce tree, shrub, and herbaceous cover for about 1/4 mile up and downstream from each access point. Loss of plants would decrease cover for riparian birds and might harm the southwestern willow flycatcher. Proposed camping restrictions in riparian areas and closure of most riparian road crossings would reduce the potential for these impacts.

Road Designations

Alternative 2 would limit motor vehicle use to designated roads and keep 93.9 miles of road open to recreational use. BLM would modify recreation use on 34.6 miles of road by designating them for administrative use only or by converting them to non-motorized trails. BLM would close and rehabilitate 16 miles of road, representing 2% of the planning areas's total road network on public lands. Alternative 2 would result in a high level of recreation use throughout the planning area. Closing roads would reduce impacts to wildlife, but converting roads to trail use or designating roads for administrative use is not likely to greatly alter impacts to wildlife.

The closing of 14% of the road network would reduce vehicle-related wildlife impacts described for Alternative 1. Unless travel increases dramatically on roads that are open, wildlife traffic deaths might be lower than under Alternative 1 due to road closures and restrictions. Less road access would also slightly reduce opportunities for poaching. Road closures and restrictions, coupled with the designated road system, would reduce opportunities for unauthorized off-road travel and allow BLM to more easily detect and enforce unauthorized travel.

In grassland habitat pronghorn would benefit from the seasonal closure of Road Canyon to vehicles. But increased use of South Road between Highway 82 and Road Canyon might increasingly disturb pronghorn. Vehicle-based recreation would also curtail the use of Oak Tree Canyon as a movement and dispersal corridor.

Alternative 2 might cause slightly less disturbance to agave stands and slightly less soil compaction than would Alternative 1 and slightly less affect the agave plant, which provides an important food source (nectar and pollen) for the endangered lesser long-nosed bat during migration.

Under Alternative 2 BLM would close to vehicle use all but one riparian road crossing on Cienega Creek. The impact to vegetation and wildlife would be about 40% less under Alternative 2 than under Alternative 1. Alternative 2 would also slightly less affect the southwestern willow flycatcher than would Alternative 1.

Arizona Trail

Under Alternative 2 a total of 11.6 miles of new trail would be built, most within ½ to ¼ mile of existing roads. Four miles would be built close to the riparian zones of Empire Gulch and Cienega Creek. The remainder would be built in upland habitats.

Trail building would disturb some surface and destroy vegetation. These effects are discussed in the off-road vehicle designation and road designation sections of Alternative 1 impacts to wildlife. Trail building and use might trample or reduce some stands of agave. Because of the trail's closeness to existing roads, where the degree of disturbance to wildlife and habitat is already high, the increase in recreational disturbance to wildlife would be less than under Alternative 1.

Because of the closeness of the Arizona Trail to riparian habitats it is inevitable that considerable recreational activity would occur in the riparian zone because of the shade and reduced temperature

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afforded within the tree canopy. Recreational camping would inevitably reduce some vegetation cover despite restrictions on camping in riparian areas, trail riding along the stream banks, and activity in the stream itself. Recreation would also disturb breeding birds and their habitat. This loss of cover and disturbance could affect the southwestern willow flycatcher if it breeds in the area in the future, by the following:

- Frightening birds away from nests.
- Trampling vegetation cover that shelters birds from the elements.
- Cutting or breaking down trees that harbor nests or resting cover.

The trail would increase horse use, bare ground, and seed-bearing manure along the riparian area. These changes could improve foraging conditions for the brown-headed cowbird. They might also lead to increased opportunities for nest parasitism and reduced breeding success for the southwestern willow flycatcher and other breeding birds, including the yellow-billed cuckoo, yellow warbler, and Bell's vireo under high levels of use.

As the Arizona Trail becomes publicized and widely known, more visitors would use the area. Hence the effects of human disturbance to wildlife and habitat under Alternative 2 would be greater than under Alternative 1, which would not designate a route for the trail.

Recreation Management

Designating recreation zones would slightly affect upland wildlife under Alternative 2. These designations relate to recreation opportunities and involve access, road conditions, developments, and quality of experience. Most of the planning area would be designated Zone 3, which is close to existing conditions. Therefore, zone prescriptions under Alternative 2 would not greatly alter the impacts of recreation discussed in previous sections. Since all-terrain vehicles, off-highway vehicles, and other four-wheel drive vehicles can access all zones, the impacts from motor travel would be as previously discussed and would not change from one zone to another.

In Zone 1 recreational impacts from camping would cease because camping would not be permitted. Developing the ranch headquarters and increased vehicle use on the entrance road could have moderate to high effects on wildlife. These effects would include vehicle impacts as described in the off-highway vehicle section above and disturbance and displacement of wildlife in response to increased activity.

In Zone 2 recreational impacts from camping and group use would be concentrated in designated areas rather than dispersed throughout the zone. Zone 2 would consist of about 7% of the planning area. This amount would be a slight improvement from Alternative 1, which proposes no recreation zones.

In Zone 3 (44,387 acres) BLM would not restrict camping to designated areas and would allow dispersed camping. Recreational use would be more diffuse, and impacts would be the same as under Alternative 1 for 90% of the planning area.

Under the activity plans for Alternatives 2, 3, and 4 the following impacts would be expected from the recreation proposals:

- Establishing a permit system could directly, indirectly, or cumulatively affect wildlife or wildlife habitat. The permit system could help ensure that visitor levels are consistent with sustaining wildlife habitats and populations.
- A fee program option could benefit wildlife by providing funding to mitigate recreation impacts on wildlife. The fee program could

also deter some visitors from using the area in the short term. In the long term, gradual acceptance of a fee system would probably no longer depress visitation levels.

- Acquiring a special land use permit from the Arizona State Land Department would have slight direct, indirect, or cumulative impacts on wildlife or wildlife habitat.
- Developing an interpretive and educational plan would have slight direct, indirect, or cumulative impacts on wildlife or wildlife habitat. Wildlife-related education might have a slight, beneficial, indirect impact. Some people might voluntarily curtail detrimental activities in response to knowledge gained from BLM's education efforts.
- Developing a recreation maintenance plan would not directly, indirectly, or cumulatively affect wildlife or wildlife habitat. But maintenance activities could temporarily displace wildlife species, or result in localized short-term disturbance or loss of habitat.

The activity plan for Alternative 2 would have several impacts. Designating three group sites and five designated camping areas would increase trampling, fuel wood cutting, clearing, and loss of vegetation cover in these areas within Zone 2. Designations would cause recreation impacts to concentrate around each site. At these sites, species such as Mearn's quail, Baird's sparrow, grasshopper sparrow, and other birds that prefer high percentages of native grass and forb cover would decline in number. Because of high levels of activity by visitors and pets, ungulates and other large species would tend to avoid these areas. Pronghorn use, for example, near the southern group sites or camp areas would be expected to decline.

Establishing permanent group sites and designated camp areas would increase human refuse and food waste if visitors do not adhere to Leave No Trace principles. Any substantial levels of refuse and waste would attract colonization by nonnative birds such as starlings and house sparrows. These birds could out compete native cavity-nesting birds (acorn woodpecker, American kestrel, ash-throated flycatcher) in and around these sites, causing local declines in native bird species. Any substantial increases in human refuse in and around designated camp areas would increase food sources for deer mice, house mice, and native scavengers such as the striped skunk and common raven. The coyote, a generalist predator/scavenger, would benefit from increased rodent numbers and increased refuse–a food source.

The above mentioned impacts might be less when organized groups use the sites. Typically these groups would abide by BLM stipulations and clean up most refuse. To do otherwise could result in cancellation of their permit and exclusion from future use.

Soil compaction at these sites would increase bare ground, which would favor such wildlife species as horned lark, cowbird, and Brewer's blackbird.

Livestock Grazing

Under Alternative 2 livestock would graze 42,155 acres of grassland and oak woodland habitats on public lands. This area is 300 acres more than under Alternative 1. The remaining 3,919 acres would be contained within exclosures.

Because Alternative 2 proposes a totally flexible stocking rate and cattle would graze State Trust Lands or private lands during portions of the year, the number of livestock on public land at any one time would vary widely. According to the examples of a flexible stocking rate that could be implemented for Alternative 2 under different rainfall regimes (Chapter 2, Tables 2-21, 2-22, 2-

23), the stocking rate on public lands could vary from 861 cattle year long to 349 cattle year long. Over a year with high rainfall, for example, an amount of livestock use equal to 10,332 animal unit months (or 861 cattle per year) would occur on public lands. Table 4-1, compiled from information in Tables 2-21, 2-22, and 2-23, shows the amount of forage that livestock would consume on public lands under the high, normal, and low rainfall regimes.

Under Alternative 2, livestock would graze 64,649 acres of grassland and woodland habitat on State Trust Land, the same amount as under Alternative 1. If stocking rates are as varied as they are on public lands based on input from the Biological Planning Team, from 519 to 1,209 cattle could be present on State Trust Lands. Table 4-2, compiled from information in Tables 2-21, 2-22, and 2-23, shows the amount of forage that livestock would consume on State Trust Lands under the high, normal, and low rainfall regimes.

Table 4-3, compiled from information in Table 2-24, shows the amount of forage that livestock would consume for all allotments combined in the high, normal, and low rainfall regimes under Alternative 2. As under Alternative 1, adjustments in livestock numbers would result in the percent of available forage consumed remaining fairly constant.

Table 4-1. Forage Consumed by Livestock on Public Lands in the Planning Area under Three Rainfall Regimes

Rainfall Regime	Cattle Year-Long	Million Pounds of Forage Consumed/Year	% of Available Forage Consumed
High	861	8.3	67
Normal	520	5.0	61
Low (unfavorable)	349	3.4	63

Table 4-2. Forage Consumed by Livestock on State Trust Lands in the Planning Area under Three Rainfall Regimes

Rainfall Regime	Cattle Year-Long	Million Pounds of Forage Consumed/Year	% of Available Forage Consumed
High	1,209	11.6	62
Normal	750	7.2	58
Low (unfavorable)	519	5.0	61

Table 4-3. Forage Consumed by Livestock on All Allotments in the Planning Area under Three Rainfall Regimes

Rainfall Regime	Cattle Year-Long	Million Pounds of Forage Consumed/Year	% of Available Forage Consumed
High	2,110	20.3	64
Normal	1,295	12.4	60
Low (unfavorable)	887	8.5	62

Also as under Alternative 1, trampling would reduce more vegetation cover. The loss of cover to trampling might be slightly higher or lower, depending on the number of livestock present. This number would vary from year to year. But the impacts of concentrated use around stock tanks would be similar to those under Alternative 1 since these impacts have accrued over the years of use and do not change much in the short term.

Under Alternative 2 operations would stock slightly more cattle (29) than under Alternative 1 but on 300 more acres. In normal and particularly unfavorable (low rainfall) years, the numbers stocked per acre would probably track the available forage better than under Alternative 1 because the stocking rates would be based on more extensive monitoring data.

The potential for reduced cover and forage (based on the potential for livestock forage removal) for grassland wildlife species such as Baird's sparrow, pronghorn, and grasshopper sparrow under Alternative 2 would stay about the same from year to year as the stocking rate is adjusted. The amount of cover removed under Alternative 2 could be slightly higher or lower than under Alternative 1, depending on the year and the amount of rainfall. This amount is difficult to determine because of the wide variability in potential livestock use.

The potential for reduced cover and forage (based on the potential for livestock forage removal) for oak woodland species such as Mearn's quail, white-tailed deer, and bunchgrass lizard under Alternative 2 would stay about the same from year to year as the stocking rate is adjusted. The amount of cover removed under Alternative 2 could be slightly higher or lower than under Alternative 1, depending on the year and the amount of rainfall. This amount is difficult to determine because of the wide variability in potential livestock use.

The potential for livestock to remove more than 55% by weight of available forage and reduce local Mearn's quail populations would be slightly less than under Alternative 1 because the allowable utilization range would have been lowered from 40-60% to 30-40%. Monitoring would be needed to ensure that utilization meets this range. The potential for livestock to affect the white-tailed deer's use of the habitat would also be slightly less than under Alternative 1 because of the lowered allowable utilization range.

The potential under Alternative 2 for livestock consumption of growing agave stalks would be slightly less than under Alternative 1. Some livestock (bulls) would still be present on ecological sites that support most agave populations when stalks are first bolting. If the Biological Planning Team recommends that the agave stand receive total rest from grazing and if

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the livestock users agree, the lesser long-nosed bat, which feeds on nectar and pollen from agave blossoms, would be less harmed than under Alternative 1.

Livestock grazing under Alternative 2 would affect the southwestern willow flycatcher and other riparian birds less than under Alternative 1. An additional 520 acres of riparian areas would be excluded from livestock grazing in addition to the 659 acres already excluded. Attracted to riparian areas by abundant forage, shade, and water, livestock would continue to consume and trample vegetation at watering points and livestock crossings as described for Alternative 1. The addition of two livestock crossing lanes will disturb an additional acre of riparian vegetation.

Conditions created by livestock would continue to attract cowbirds. Cowbirds would continue to be present and have the potential to parasitize songbird nests, including those of willow flycatchers (should this species attempt to nest in the area). No nesting flycatchers have been recorded in the area, but the area has not been thoroughly surveyed.

Alternative 2 proposes exclosures for 2,740 more acres outside riparian zones. Exclosures might slightly but directly benefit upland species, particularly smaller species that could use the protected habitats and increased cover within them. Some of the exclosures would be too small and confining to directly benefit species with large ranges such as pronghorn. But exclosures might have more substantial long-term indirect impacts for upland species from (1) their use as comparison sites for a better understanding how grazing affects upland wildlife habitats and (2) later management responses through the use of this information in the biological planning process.

Roads needed for livestock operations are provided within the existing road network under Alternative 1 as well as the designated road network under Alternative 2. BLM determined that no new roads would be needed although Alternative 2 would designate some roads used for livestock operations for administrative use only. Therefore, Alternative 2 would result in no net change from Alternative 1 in disturbance from the use of these roads for livestock operations.

Despite the potential for slightly higher livestock use under Alternative 2 than under Alternative 1, the biological planning process could increase population viability and habitat quality for some wildlife. In addition, it is a process for adjusting livestock grazing (and recreation use) to address and resolve issues that are raised for wildlife species. Monitoring for habitat and species would be more intensive than under Alternative 1 and might allow for more effective detection of habitat and population declines. The Biological Planning Team would use monitoring data to change management to reverse these declines. For example, if habitat conditions for pronghorn, Baird's sparrow, grasshopper sparrow, and Botteri's sparrow continue to decline despite the implementing of management actions, monitoring could provide clues as to further corrective actions.

The added monitoring of the biological planning process under Alternative 2 would help assess grazing (and recreation) impacts on selected species. Evidence of significant increases in habitat quality or in wildlife populations tied to livestock management changes is lacking under current management due to limited monitoring data. Existing data suggests that some wildlife populations (pronghorn and mule deer, for example) are in a state of prolonged decline throughout Arizona. The cause of this decline is subject to speculation.

From Special Designations

Areas of Critical Environmental Concern

Alternative 2 would designate the entire planning area as an ACEC. Since the ACEC plan is the same as the interdisciplinary activity plan for Alternative 2, the management actions and their impacts on terrestrial wildlife are those discussed previously under impacts of Alternative 2 on terrestrial wildlife.

Cumulative Impacts to Terrestrial Wildlife from Alternative 2

Because of continuing economic pressure to subdivide and develop private land, much private land in and around Sonoita/Elgin is likely to be developed as residences and businesses, despite the BLM's collaborative efforts. Roads, fences, and human disturbance would still increase, especially near the southern and western edges of the planning area although perhaps less than under Alternative 1.

Under Alternative 2 some private land holders might decide to resist the economic incentive and continue ranching. Some adjacent undeveloped private lands, along with the public lands and State Trust Lands, would continue to provide habitat for grassland wildlife species such as grasshopper sparrow and Baird's sparrow. But invading nonnative birds found near human development and habitation, such as starlings and house sparrows, could still compete with wintering Baird's sparrows and breeding grasshopper sparrows. These species might be able to better coexist than under Alternative 1 because of the presence of undeveloped private lands.

The public lands in the planning area, along with some adjacent undeveloped, private lands, could become a refuge for many grassland wildlife species such as grasshopper sparrow and Baird's sparrow.

High-quality pronghorn habitat on public land is limited within the planning area. Quality habitat on State Trust and private lands is important to the survival of the herd. Maintenance of a sustainable pronghorn herd would be doubtful, as under Alternative 1, because of human encroachment and changes in habitat quality on private lands (which are vital to pronghorn survival). Increased recreation use, domestic dogs, and other pressures would also restrict pronghorn from moving about and occupying otherwise suitable habitat.

These pressures would steadily increase and might eventually reach a level at which a self-sustaining pronghorn herd could not persist. For example, increased fences and homes have severely curtailed pronghorn movement from the Babocomari Ranch to public lands north of Elgin Road. These forces may have confined pronghorn to a 1,200-acre patch of public lands south of Highway 82.

Studies of pronghorn by Ockenfels and others (1994) suggest that this patch might not ensure long-term viability of pronghorn unless movement corridors can be maintained or, in some cases, re-created. A viable herd might be maintained if cooperative private landowners preserve enough tracts of quality grassland habitat with movement corridors connecting them to public lands. Alternative 2 would be more likely than Alternative 1 to maintain such tracts, but Alternative 2 might not succeed.

Species inhabiting oak woodland habitats, such as Mearn's quail, white-tailed deer, and bunchgrass lizard, would be subject to less pressures on remaining public land than under Alternative 1. Unlike pronghorn, white-tailed deer are somewhat more compatible with high levels of human disturbance and would probably persist as under Alternative 1.

Despite actions proposed by Alternative 2, increased human occupation; fence construction;

road building; and other alterations of habitat on private, State Trust, public, and national forest land would restrict important movement corridors. Wide-ranging species such as jaguar, mountain lion, black bear, mule deer, Gould's turkey, and coatimundi might have a few more movement corridors open to them under Alternative 2 than under Alternative 1. But human-wildlife encounters would continue to increase.

Under Alternative 2 the likelihood of achieving the wildlife objectives would still be doubtful, though less so than under Alternative 1. Enough movement corridors would be slightly more likely to remain under Alternative 2 than under Alternative 1 to permit the maintenance of biological diversity desired in the objective. As under Alternative 1, the high levels of human use likely under Alternative 2 would increase the difficulty of maintaining viable wildlife populations and successfully recovering and reestablishing species.

Upland species might still decline due to impacts outside public lands in the planning area. For example, Baird's sparrow, which migrate in summer, might decline due to habitat alterations on its summer range.

Several adjustments in livestock management might also be needed to maintain the levels of vegetation cover desired in the objectives. With enough monitoring data to support these adjustments, Alternative 2 might be more likely than Alternative 1 to make the modifications to achieve the desired vegetation objectives. But these vegetation objectives might not translate into population increases of priority species.

The vegetation treatment program collaboratively implemented under Alternative 2 could improve habitat conditions for grassland species on public lands and surrounding lands through cooperative projects.

Under Alternative 2 the southwestern willow flycatcher would continue to use the riparian habitat along Cienega Creek during migration. This area has been documented as an important migratory stopover for many neotropical migratory bird species (Krueper 2000). Excluding more riparian acres from livestock use than Alternative 1, Alternative 2 would present a slightly higher probability than Alternative 1 that southwestern willow flycatchers would nest in the area.

Under Alternative 2 livestock would consume some agave, and numbers of agave would decrease along rights-of-ways and roads, in prescribed fire units, and around recreation facilities. This loss of agave would negligibly affect the lesser long-nosed bat.

Impacts to Terrestrial Wildlife from Alternative 3

From Desired Resource Conditions

Watershed, Fish and Wildlife, Visual, and Cultural Resource Management

Impacts under Alternative 3 would be the same as under Alternative 2.

From Land Use Allocations

Mineral Development

Mineral development under Alternative 3 would affect wildlife and wildlife habitats much as would Alternative 1 but over a potentially much larger area. No estimate of disturbed acres is possible because there are no credible estimates of the number of mines and gravel pits that might be developed. The planning area might have limited potential for new mineral discoveries.

Clearing vegetation and topsoil for the pits, stockpiles, roads, ancillary facilities, storage sheds, offices, housing, parking, and loading areas would destroy and degrade wildlife habitat. Extracting locatable, saleable, or leasable minerals would

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disturb the surface. The level of impacts described for Alternative 1 could be greater under Alternative 3 because Alternative 3 would open more acreage to mineral exploration and development.

Mineral extraction under Alternative 3 would disturb or degrade an undetermined amount of grassland habitat and directly disturb such grassland wildlife as Baird's sparrow, pronghorn, grasshopper sparrow, and bunchgrass lizard. Mineral extraction under Alternative 3 would also disturb an undetermined amount of oak woodland habitats and eliminate or degrade habitat for such species as the Mearn's quail, white-tailed deer, and alligator lizard. Mining would disturb agave, which grows in scattered clumps in both woodland and grassland and might harm the lesser long-nosed bat, which feeds on nectar and pollen from agave blossoms.

Under Alternative 3 a total of 4,859 acres of riparian habitat within the Nogales Spring and Cienega Creek Areas of Critical Environmental Concern (ACECs) would not be subject to many of the impacts that could result from the mining of salable or locatable minerals. These ACECs would still be subject to many of the same impacts under leasable mineral exploration and development. But the development potential of such leasable minerals as oil, gas, and thermal energy is not known to be great.

Utility Rights-of-Way and Land Use Authorizations

The impacts of utility rights-of-way and land use authorizations on upland wildlife under Alternative 3 would be the same as under Alternative 2 with the following exception.

An additional right-of-way corridor would parallel Highway 82 for underground utilities. Surface disturbance would result in loss of native grass species and potential for replacement with nonnative species such as Johnson grass, Lehmann lovegrass, and Russian thistle. This loss would slightly reduce the suitability along the roadside for native birds such as Baird's sparrow and grasshopper sparrow but would improve habitat for nonnative species such as starlings and house sparrows.

Off-Highway Vehicle Management

Impacts would be the same as under Alternative 2.

Road Designations

Alternative 3 would convert 7.6 miles of road to trails and close 11.4 miles of road. The miles of closed roads would make up 8% of the planning area's current road network on public land. These adjustments would not substantially alter the impacts discussed for road designations under Alternative 1.

Arizona Trail

Under Alternative 3 the Arizona Trail would affect terrestrial habitat and wildlife species the same as under Alternative 2.

Recreation Management

The designation of recreation zones under Alternative 3 would affect upland wildlife much as under Alternative 2. But Alternative 3 would include a greater area in Zone 2, where impacts of camping and group events would be restricted to designated sites. Under Alternative 3, Zone 2 would consist of nearly 17,000 acres, more than four times as large as Zone 2 under Alternative 2. Extensive, dispersed use would therefore disturb less wildlife, and localized concentrated use would inflict slightly more disturbance. Most of the area would still be in Zone 3, which would be similar to existing management in impacts to wildlife.

Alternative 3 would designate two additional group sites and one additional camp area than would Alternative 2. Therefore the impacts of these concentrated use areas as described for Alternative

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2 would be extended to these additional areas. These additional areas are within grassland habitats and would most harm species inhabiting open grasslands.

Under Alternative 3 the two additional group sites would be in pronghorn habitat. Pronghorn tend to flee further from disturbance than other ungulates, so concentrated use areas more affect them. Pronghorn use near these sites would decline in response to the sites' occupation by visitors with pets.

Livestock Grazing

Under Alternative 3 livestock would graze 43,895 acres of grassland and oak woodland habitats on public lands. BLM would permit livestock use equal to 5,832 animal unit months or 486 cattle per year on public lands in the planning area. This is less livestock use than would potentially occur under either Alternative 1 or 2 in normal and above-average rainfall years. At this stocking level, these animals would consume an average of 4 million pounds, dry weight, of vegetation material per year. The 486 cattle would be consuming 34% of available forage in a favorable (high rainfall) year, 52% of available forage in a normal rainfall year, and 78% of available forage in an unfavorable (low rainfall) year.

Under Alternative 3 livestock would graze 64,649 acres of grassland and woodland habitat on State Trust Land. Over the course of a year an amount of livestock use equal to 7,932 animal unit months or 661 cattle per year would occur on State Trust Lands in the planning area (Chapter 2, Table 2-28). This use would remove on average 6.3 million pounds of forage per year from State Trust Lands. The 661 cattle would be consuming 32% of available forage in a favorable (high rainfall) year, 48% of available forage in a normal rainfall year, and 72% of available forage in an unfavorable (low rainfall) year.

Available annual vegetation production would vary between 14 million and 33 million pounds on all allotments combined in the planning area. Livestock would consume an average of 11 million pounds of forage per year or between 34 and 78% of the available forage, depending on the production (Chapter 2, Table 2-29).

In a series of years with less than the mean annual rainfall, the goals and objectives in this plan for vegetation and wildlife would probably not be met, even with this conservative level of livestock grazing. In such a situation BLM would not meet the standards required in the Arizona Standards for Rangeland Health and Guidelines for Grazing Administration (Appendix 2). BLM would systematically implement and monitor the modification to the livestock grazing regime (including reduced numbers of cattle until meeting the objectives. Since Alternative 3 would not apply the Biological Planning Team approach, this process of monitoring and adjustment could take several seasons before the livestock grazing is brought into balance with the capacity of the range and the rangeland standard is attained.

Under Alternative 3 livestock would graze most grassland habitats. Alternative 3 would result in potentially less loss of cover on public lands in most years (due to the lower livestock use levels) for grassland wildlife such as Baird's sparrow, pronghorn, and grasshopper sparrow than would Alternatives 1 or 2. Habitat conditions for species that prefer bare ground, such as horned larks, black-tailed jackrabbit, and meadow larks, would not increase much.

Livestock would graze most oak woodland habitats under Alternative 3, which in most years would have less potential than Alternative 1 or 2 to reduce habitat components (mainly cover) for such species as bunchgrass lizard, Mearn's quail, and white-tailed deer.

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Under Alternative 3 livestock would consume slightly fewer growing agave stalks than under Alternatives 1 or 2 in most years due to the conservative stocking rate. But as under Alternatives 1 and 2, the impact on foraging habitat for the lesser long-nosed bat–which feeds on nectar and pollen from agave blossoms–is expected to be negligible.

Under Alternative 3 BLM would exclude 699 acres of Cienega Creek and Empire Gulch from livestock grazing. Cattle would still have access to small amounts of riparian area at livestock crossing lanes and in portions of Empire Gulch, Gardner Canyon, Cinco Ponds, Cienega Creek Narrows, and Nogales Spring. The impact of this livestock use on the southwestern willow flycatcher and other riparian birds would be the same as under Alternative 2.

The impacts of the 14 planned livestock developments would be the same as described for Alternative 2.

Roads needed for livestock operations are provided within the existing road network under Alternative 1 and the designated road network under Alternatives 2 and 3. BLM found no new roads were needed but would designate some roads used for livestock operations for administrative use only under Alternatives 2 and 3. Therefore, BLM expects no net change in disturbance from livestock operation use of these roads under Alternatives 1, 2, or 3.

Stocking rates under Alternative 3 (by applying BLM's standards and guidelines policy) would be adjusted more slowly than under Alternatives 1 or 2. But over the long term, livestock grazing management under Alternative 3 would achieve vegetation and wildlife habitat objectives.

From Special Designations

Areas of Critical Environmental Concern

Alternative 3 would designate two ACECs—Cienega Creek ACEC and Nogales Spring ACEC. Both consist of riparian areas, and their designation and management would not greatly affect upland wildlife. For analysis of the impacts of actions proposed under the ACEC plans for Cienega Creek and Nogales Springs, see the analysis of impacts on terrestrial wildlife from watershed, upland, and riparian actions under Alternative 2.

Cumulative Impacts to Terrestrial Wildlife from Alternative 3

The cumulative impacts of Alternative 3 would be the same as under Alternative 1. The likelihood of achieving the wildlife objectives would also be about the same as under Alternative 1.

Impacts to Terrestrial Wildlife from Alternative 4

From Desired Resource Conditions

Watershed, Visual and Cultural Resources Management

Impacts under Alternative 4 would be the same as under Alternative 2

Fish and Wildlife Management

The impact of wildlife management under Alternative 4 would be substantially the same as under Alternative 2. But the more restrictive management environment on public lands under Alternative 4 would greatly enhance the potential to maintain habitat quality, reduce habitat loss, and maintain viable wildlife populations on the 49,000 acres of public lands in the planning area. With

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less emphasis on collaboration, BLM could more quickly make management decisions. But BLM's limited potential for input on decisions for surrounding lands could have far-reaching impacts on wildlife. The impacts on the 120,000 acres of state and private lands could be substantial if these lands are developed and the areas are lost as habitat for many species (see cumulative impacts section).

From Land Use Allocations

Mineral Development

Mineral development under Alternative 4 would affect wildlife the same as under Alternative 2.

Utility Rights-of-Way and Land Use Authorizations

Utility rights-of-way and land use authorizations under Alternative 4 would affect upland wildlife the same as under Alternative 2 except that rights-of-way would be limited to one designated corridor rather than two.

Off-Highway Vehicle Management

Impacts under Alternative 4 would be the same as under Alternative 2

Road Designations

Alternative 4 would designate 86.8 miles of road for motorized recreation use, restrict 28.5 miles of road to administrative use, and close and rehabilitate 27.6 miles of roads. The road closures would represent 20% of the planning area's road network on public lands. Therefore impacts to wildlife from motorized recreation could greatly decline. By not converting roads to non-motorized trails, BLM would eliminate the potential of added impacts from nonmotorized recreation.

A high level of recreation use throughout the planning area can still be expected under Alternative 4, and impacts projected for Alternative 1 from motorized recreation (both authorized and unauthorized use) would still occur. Overall, the harm would be slightly less than under the other alternatives. Less vegetation cover would be lost. Agave stands might be slightly less disturbed and soil compaction slightly reduced from conditions under Alternative 1. Alternative 4 might also inflict slightly less harm on the endangered lesser long-nosed bat than would Alternative 1.

Under Alternative 4 BLM would close to vehicle use all but one riparian road crossing on Cienega Creek. The impact to vegetation and wildlife would be about 40% less under Alternative 4 than under Alternative 1. Motorized recreation under Alternative 4 would slightly less harm the southwestern willow flycatcher than under Alternative 1. But recreation would still somewhat affect bird species and nesting cover.

Arizona Trail

The impacts of the Arizona Trail on wildlife under Alternative 4 would be essentially the same as under Alternative 1, under which the Arizona Trail would not pass through the planning area.

Under Alternative 4 horse use is likely to increase along the riparian zone as a result of installing a nationally advertised trail. Increased bare ground and manure near the stream would increase nest parasitism by cowbirds. Impacts to riparian birds, including the southwestern willow flycatcher, would be as the same as under Alternative 2.

Recreation Management

The impacts on wildlife of designating recreation zones under Alternative 4 would not greatly differ from those under Alternative 2.

Alternative 4 would designate only one group site and four camp areas. Impacts from these concentrated use sites would be slightly less than

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under Alternative 2. But Alternative 4 would designate the most area in Zone 3, and impacts from dispersed recreation would be greater than under Alternatives 2 or 3 and the most like Alternative 1.

Livestock Grazing

Under Alternative 4 livestock would not graze 41,855 acres of public land that they now graze, and livestock would not trample and reduce the vegetation cover on these acres. On average, 7 million more pounds of vegetation could be used for wildlife cover and forage needs on public lands than under Alternative 1; 3.4 to 8.3 million more pounds of vegetation than under Alternative 2, and 4 million more pounds of vegetation than under Alternative 3.

Under Alternative 4 livestock would still likely graze 64,649 acres of grassland and woodland habitat on State Trust Land. Over a year, an amount of livestock use equal to 13,776 animal unit months (or 1,148 cattle per year) would occur on these lands.

This livestock use would remove 6.3 million pounds of forage per year from State Trust Lands. If a series of years occurs with less than mean annual rainfall, livestock operators would decide how to adjust livestock use, with some input from the State Land Department. BLM would not contribute to decisions for stocking rates on State Trust Land since it would no longer hold state grazing leases.

Operators are likely to adjust livestock use in response to forage availability, range condition, and livestock nutritional needs. The need to reduce impacts to sensitive habitats or wildlife species would probably not greatly influence stocking rate decisions on State Trust Lands. The result might be less grass cover on State Trust Land for sensitive upland species during years of low rainfall.

The ungrazed vegetation would provide more cover on public land than under other alternatives for grassland wildlife, improving habitat for Baird's sparrow, pronghorn, and grasshopper sparrow; and for oak woodland species such as the Mearn's quail, white-tailed deer, and bunchgrass lizard.

Cowbird nest parasitism of southwestern willow flycatcher and other riparian species would slightly decrease from that under Alternatives 1, 2, or 3 because no livestock waters would be built close to the riparian area.

Cowbirds have been known to fly up to 4 miles from feeding areas to engage in nest parasitism (Robinson and others 1995). An estimated 25 residences are on private land within 4 miles of the riparian area. Most of these have horses (five or more per residence) or other livestock that produce forage conditions favorable for cowbirds. Hence some parasitism is bound to occur under Alternative 4.

Riparian habitat under Alternative 4 would become less fragmented than under the other alternatives because no livestock crossings would be needed, and southwestern willow flycatcher habitat would not be degraded by livestock use.

Alternative 4 would produce slightly more flowering agave stalks, providing nectar and pollen for the lesser long-nosed bat. Native ungulates (including pronghorn, deer, and javelina) would continue to consume agave stalks, and thus a percentage of stalks would fail to reach maturity.

The absence of livestock would reduce the need for some roads proposed for administrative use, under Alternatives 1, 2, and 3. BLM would close some of these roads for habitat restoration under Alternative 4 and maintain others for recreation use (see previous section on road closures and restrictions). Since livestock operators would no longer support road maintenance, some roads might decline in condition and be used less often. The result would be less road-related wildlife disturbance and mortality.

From Special Designations

Areas of Critical Environmental Concern
ACECs under Alternative 4 would have the same impacts as under Alternative 2.

Cumulative Impacts to Terrestrial Wildlife from Alternative 4

As under other alternatives, most larger upland wildlife species depend on habitats outside the planning area. Loss of habitat or reduction in habitat quality on nonpublic lands and lands outside the planning area could still result in habitat loss and population declines despite actions taken under Alternative 4 for the public lands.

Because pronghorn need large amounts of space, the increase in cover and forage under Alternative 4 might not be enough to offset the loss of pronghorn habitat to private land development. Land owners might be less inclined to preserve open space and maintain livestock operations on private land, as might be the case under Alternative 2. As under Alternative 1, the loss of grassland habitat on private lands could lessen the viability of the pronghorn herd when combined with recreation pressure on the planning area's public lands. As a result, the pronghorn herd might not be able to sustain itself on the remaining fragmented public land tracts.

The planning area would likely become the sole refuge for many grassland wildlife species such as grasshopper sparrow and Baird's sparrow if surrounding and intermixed private or State Trust lands are developed. Wintering Baird's sparrows and breeding grasshopper sparrows would be subjected to potential competition from invading nonnative birds such as starlings and house sparrows that are attracted by human development and habitation. But this competition would be less than under Alternative 1. Despite exotic competition, the native species would probably be able to coexist due to the excellent grass cover remaining on public lands.

Species inhabiting oak woodland habitats, such as Mearn's quail, white-tailed deer, and bunchgrass lizard, would be subject to similar pressures on the remaining public land. But because of increased amounts of available ground cover these pressures would be somewhat less than under Alternative 1. Unlike pronghorn, white-tailed deer are somewhat more compatible with high levels of human disturbance and would probably increase in numbers more than under Alternative 1.

Under Alternative 4 the southwestern willow flycatcher would continue to use the riparian habitat along Cienega Creek during migration. The suitability of the riparian area for nesting by southwestern willow flycatcher would increase more than under Alternatives 1, 2, or 3 due to lowered potential for nest parasitism and reduced habitat fragmentation.

Under Alternative 4 livestock would not consume agaves, but agaves would somewhat decline along rights-of-ways and roads and around recreational facilities. This agave loss would negligibly affect foraging habitat for the lesser long-nosed bat.

Under Alternative 4 the likelihood of achieving the wildlife objectives would be doubtful but less so than under Alternatives 1, 2, or 3. Movement corridors between mountain ranges would still likely be constricted and eventually cut off, harming wide-ranging species such as jaguar, mountain lion, and black bear.

The levels of human use would probably still be high under Alternative 4, and recreation would continue to affect wildlife. The removal of livestock from public lands and elimination of grazing conflicts might allow for more successful recovery and reestablishment of species. They might also permit maintenance of viable populations of more species than under Alternatives 1, 2, or 3.

Since no livestock would be grazed, sufficient levels of vegetation cover are likely to be maintained to achieve the objectives. BLM would still need to monitor the public lands to determine the effect of management on wildlife populations. But BLM might more quickly change its management than under Alternatives 1, 2, or 3 since livestock grazing would not be an issue.

Impacts to Visual Resources

Scope of Analysis: This section uses changes in the quality of visual resource conditions in the viewshed, particularly from prime viewing areas, to compare the impacts of the alternatives on visual resources.

Impacts to Visual Resources from Alternative 1

From Desired Resource Conditions

Watershed: Upland, Riparian, and Aquatic Vegetation Management

Some older vegetation treatment projects (cut stumps, pulled trees) from an era before BLM management slightly intrude on visual resources. Creek restoration projects can create short-term visual intrusions due to restoration work. Scenic values are maintained by using visually nonintrusive rocks and materials. For project sites with cut vegetation, heavy equipment tracks and other disturbances are naturalized within 1-3 years of completion.

Fish and Wildlife Management

Existing Fish and wildlife management would continue to cumulatively enhance scenic values.

Visual Resource Management

In general the planning area retains a high scenic value under current management. Perceptions differ on what standards should be used to determine quality. A VRM Class III designation could slightly and cumulatively degrade visual quality if BLM allows major visually intrusive projects without the more restrictive Class II designation.

Cultural Resource Management

Impacts from data recovery projects (archeological digs) are rare and do not significantly degrade high scenic values. If need be, areas can be naturalized or restored. BLM would develop the Empire Ranch headquarters to maximize viewsheds for visitors and to minimize added impacts from parking, access, and other facilities. BLM would keep the historical themes and settings during site design by using styles, colors, materials, and other architectural elements to reduce conflict.

From Land Use Allocations

Mineral Development

Any major mineral development on the "seen" viewshed of the planning area, especially the Empire Mountains, could degrade current high scenic quality. The social and political impacts of visual intrusions created by mining in the region's scenic areas are high. Impacts on visual resources could include surface disturbance from road building, increased traffic, and development of the mined site and presence of equipment and structures.

Utility Rights-of-Way and Land Use Authorizations

Existing utility lines and developments requiring land use permits intrude on the quality of the visual resources, but they are not dominant features from the popular viewing areas. Random development and placement of new lines due to lack of designated corridors could increase the degrading of scenic values. Lines designed to be nonintrusive over the landscape would not have as great a negative impact as other lines.

Off-Highway Vehicle Management
Under existing management the perpetuation of existing wildcat roads and the unauthorized creation of new roads can reduce scenic quality. Some barricade methods also intrude on the quality of visual resources.

Arizona Trail
Without the development of the Arizona Trail, visitors might create social trails, which would slightly degrade visual resources.

Recreation Management
Lack of recreation zones would not directly degrade visual resources if management repairs current impacts. But having no established zones indirectly allows for continual spread of hardened campsites–continually used areas where the ground becomes bare, surrounding vegetation is damaged, and fire rings and trash are evident.

Livestock Grazing
Many livestock developments, including water holes, power poles, wells, tanks, and corrals, are within view of the main touring roads and slightly reduce high scenic qualities.

From Special Designations

Areas of Critical Environmental Concern
Lack of ACEC designation under Alternative 1 might slightly reduce the resource protection emphasis that contributes to the planning area's visual quality.

Impacts to Visual Resources from Alternative 2

From Desired Resource Conditions

Watershed: Upland, Riparian, and Aquatic Vegetation Management
Some vegetation enhancement projects under Alternative 2 might temporarily or permanently intrude on the stricter standards of a Class II VRM designation.

Fish and Wildlife and Cultural Resources Management
Under Alternative 2 projects would need to conform to Class II VRM class standards, or mitigation would be required.

Visual Resource Management (VRM)
VRM Class II is the same classification required in many wilderness areas, where fewer alterations to the landscape can be allowed. This classification would ensure the mitigation of visual impacts from past and future grazing and recreation developments, major vegetation treatments, and wildlife enhancement projects that create structures or alter the landscape, thereby benefitting the visual landscape.

From Land Use Allocations

Mineral Development
Because Alternative 2 would virtually eliminate opportunities for mineral development, mineral development would not degrade visual resources.

Utility Rights-of-Way and Land Use Authorizations
Establishing a corridor in areas that do not dominate the viewshed and in conformance with Class II VRM prescriptions should retain high

scenic values. Establishing a corridor along the existing El Paso gas line would perpetuate the visual intrusion of the service road from certain view points. The corridor in the northeast is not viewed as often as the El Paso gas line corridor, and new development, if allowed, should not dominate the viewshed. If conforming to Class II prescriptions, the corridor should retain high scenic values.

Off-Highway Vehicle Management
Limiting motor vehicles to designated roads under Alternative 2 might reduce the perpetuation of wildcat roads and the potential for creating new wildcat roads and would thus benefit visual resources. Under road closures, the reduction in miles of roads could reduce some visual intrusions. But few if any of these roads affect the prime viewshed.

Arizona Trail
Trail placement in dominant viewsheds under Alternative 2 could slightly reduce scenic qualities.

Recreation Management
Group sites, parking areas, and campsites prescribed in Zones 1 and 2 under Alternative 2 could become visual intrusions if they are placed in dominant viewsheds. The southern end of the Airstrip might become a dominant feature from a prime viewpoint (Road 900 and ranch headquarters) if not landscaped to reduce visual intrusions. Restricting camping within the main road corridors would enhance VRM values from prime viewing areas. Establishing a group site at the Airstrip might not conform to Class II standards unless it is landscaped to a more natural appearance.

Livestock Grazing
Under Alternative 2 some current livestock infrastructure might not conform to stricter Class II standards. Range improvements might also not adhere to designs that conform to stricter Class II standards.

From Special Designations

Areas of Critical Environmental Concern
Designation of more ACECs under Alternative 2 might ensure compliance of Class II VRM designation.

Impacts to Visual Resources from Alternative 3

From Desired Resource Conditions

Watershed, Fish and Wildlife, Cultural and Visual Resources Management
Impacts under Alternative 3 would be the same as under Alternative 2.

From Land Use Allocations

Mineral Development
Mineral development outside ACECs under Alternative 3 would have similar types of impacts as under Alternative 1 but at a much greater scale. Potential mineral material sales outside the ACEC could slightly impair the viewshed but would have to conform to Class II standards.

Utility Rights-of-Way and Land Use Authorizations
An added utility corridor (three versus two) under Alternative 3 would increase the potential for degrading visual resource management classes in other areas. Impacts could be mitigated. Buried utility lines could reduce visual impacts as long as the affected land is rehabilitated to conform to Class II designations. But buried lines are not feasible for all applications.

Off-Highway Vehicle Management
Impacts under Alternative 3 would be the same as under Alternative 2.

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Arizona Trail

Impacts under Alternative 3 would be similar to those under Alternative 2. Trail placement in the dominant viewshed could slightly reduce scenic qualities.

Recreation Management

Recreation Zone 2 under Alternative 3 could retain high VRM values because of limiting camping to a few designated campsites. Because Zone 2 would include the largest area under Alternative 3, this restriction might be more beneficial to visual resource values than restrictions under Alternative 2, which cover less area. Some Zone 2 developments, including some barricades and permanently altered areas for parking lots and campsites, might not conform to VRM Class II standards and would have to be mitigated. Zone 3 would have a tendency to receive more impacts to landscape because of the dispersed camping prescription. Zone 3 covers less area under Alternative 3 than under the other alternatives.

Permanent recreation use of the Airstrip would slightly mar the viewshed because the airstrip is in a prominent location and does not fit into Class II standards. Restoring and revegetating the southern end of the Airstrip instead of the northern end to camouflage proposed recreation development plans might be more suitable for retaining Class II standards.

Livestock Grazing

Impacts under Alternative 3 would be the same as under Alternative 2.

From Special Designation

Areas of Critical Environmental Concern

Impacts under Alternative 3 would be the same as under Alternative 2.

Impacts to Visual Resources from Alternative 4

From Desired Resource Conditions

Watershed, Fish and Wildlife, Cultural and Visual Resources Management

Impacts under Alternative 4 would be the same as under Alternative 2.

From Land Use Allocations

Mineral Development

Impacts under Alternative 4 would be the same as under Alternative 2.

Utility Rights-of-Way and Land Use Authorizations

Impacts would be similar to those under Alternatives 2 and 3 but would have slightly less potential for visual intrusion under Alternative 4, which would designate only one corridor instead of two or three. The proposed corridor in the northeast corner of the planning area is generally not within prime viewshed. This corridor would be the preferable alternative for retaining the quality of the viewshed from prime viewing locations on Road 900 and at ranch headquarters.

Off-Highway Vehicle Management

Impacts under Alternative 4 would be the same as under Alternative 2.

Arizona Trail

The Alternative 4 proposal for the Arizona Trail would cause the least amount of added impacts to the existing viewshed because the trail would be routed along existing roads. Using existing routes for the Arizona Trail would reduce potential adverse impacts to VRM critical vantage points

Recreation Management

The recreation zone configuration under Alternative 4 would have the most area in Zone 3. This area would receive more dispersed camping and would harm the viewshed slightly more from main viewing roads than would Alternatives 2 or 3. The partial use of the Airstrip could be reversed to the other end of the Airstrip to conform to VRM Class II

Livestock Grazing
Although livestock would no longer graze on public land, continuing cattle operations on intermixed and adjacent State Trust Lands could degrade VRM Class II values by creating the need for miles of new fence lines. Some cattle operation needs might also intrude on prime viewsheds on State Trust Lands. If BLM retains range developments for wildlife or recreation use after removing livestock, those developments would continue to intrude on visual resources.

From Special Designations

Areas of Critical Environmental Concern
Impacts under Alternative 4 would be the same as under Alternative 2.

CULTURAL AND PALEONTOLOGICAL RESOURCES

Impacts to Cultural and Paleontological Resources

Scope of Analysis: This section uses the potential for disturbance to or for increased protection of cultural and paleontological resources to compare the impacts of the alternatives on cultural and paleontological resources.

Impacts to Cultural and Paleontological Resources from Alternative 1 (Current Management)

From Desired Resource Conditions

Watershed: Upland, Riparian, and Aquatic Vegetation Management
Vegetation cover often helps to preserve archaeological sites by reducing and inhibiting soil erosion. Lack of integrated vegetation treatment in the planning area would eliminate a protective action from which most cultural resources could benefit.

Fish and Wildlife Management
Actions proposed for wildlife management under Alternative 1 would benefit cultural resources to a limited extent by limiting human and livestock disturbances.

Visual Resource Management (VRM)
Designating VRM Class III under Alternative 1 could allow some visual intrusion of the landscape surrounding the historic Empire Ranch headquarters. Such intrusions might include utility lines, roads, buildings, and other structures.

Cultural Resource Management
BLM would comply with National Historic Preservation Act mandates for preserving and treating the planning area's cultural resources. But limited funds and staff time might hamper or slow the work.

Accumulation of archaeological data would continue to be limited and would largely depend upon Class III inventories conducted on a project-by-project basis for small-scale projects and

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undertakings such as building wildlife or livestock watering tanks or fences or occasional rerouting of a short stretch of road. A data base to enable the meeting of the cultural resource objective would develop only very slowly over a long period.

BLM would probably not conduct Class I and II cultural resource inventories unless it somehow acquires special funds or an occasional scientific project funded by a university research grant or other non-BLM entity. BLM would probably not accumulate the data needed to develop a well-rounded and complete cultural resource management program for the planning area. Additionally, BLM would probably not collect or present interpretive and educational materials useful to the public.

Under all alternatives, BLM would evaluate, stabilize, and manage historic properties under the Secretary of the Interior's Standards for National Register Eligible Sites. Under Alternative 1 BLM would continue to stabilize and preserve the Empire Ranch headquarters buildings, but the work would largely depend upon grants obtained through the Empire Ranch Foundation. The buildings would probably deteriorate faster than stabilization could be funded through the foundation or sporadically by BLM.

Limited funds and staff time would probably hamper or slow work on completing National Register forms for historic buildings (other than the Empire Ranch House, which is listed on the National Register). Alternative 1 would limit the scope of interpretive programs at the Empire Ranch headquarters and would not include the educational opportunities provided under Alternatives 2, 3, and 4.

From Land Use Allocations

Mineral Development

Under Alternative 1 keeping 48,542 acres of acquired public lands closed to locatable and leaseable mineral development and closing all public lands to saleable mineral (discretionary) development would protect cultural and paleontological resources in those areas from mining disturbance. But mining could disturb some cultural and paleontological resources on 5,915 acres of split-estate lands and 458 acres of original public domain in the Empire Mountains. Mining plans of operations could be designed to avoid cultural or paleontological sites or mitigate impacts through data recovery.

Utility Rights-of-Way and Land Use Authorizations

With an absence of designated utility corridors, construction and maintenance of randomly placed utility lines could disturb some cultural and paleontological sites. But utility lines could be designed to avoid sites, or data recovery could mitigate impacts.

Off-Highway Vehicle Management

The most serious threat to the planning area's cultural resources is posed by people illegally driving four-wheel-drive vehicles, all-terrain vehicles, and motorcycles off of roads. Vehicles can damage cultural sites by driving over them. Some people might also use these types of vehicles to drive into remote areas, where they illegally collect surface artifacts and vandalize and loot cultural sites. Protecting the planning area's cultural resources while allowing recreational vehicle use in the area would be a difficult task.

Under Alternative 1 limiting vehicles to the existing 116.4-mile road network would continue impacts at several locations where roads cross cultural sites. Alternative 1 would also allow access to remote areas where sites are vulnerable to looting, vandalism, and illegal surface collecting. By not allowing the creation of random new roads, Alternative 1 would help protect some sites. Roads affecting sites could be rerouted to avoid causing further damage. Dirt or gravel pads could be laid on sections of roads crossing sites, to protect against further damage. If no other course is possible, BLM could close a road that is causing or allowing a site to be damaged. BLM would also close to public use roads providing access to sites being looted, vandalized, or subjected to illegal surface collection.

Designating 20.3 miles of road for administrative use only would restrict public access into some areas where cultural sites are vulnerable to impacts. BLM would conduct Class III cultural resource surveys where roads are closed and reclaimed, as well as along roadways where such inventories have not been conducted. Where necessary and feasible, roads would be rerouted to avoid further site impacts, or data collection would be used to mitigate impacts.

Arizona Trail
By not designating a corridor for the Arizona Trail, Alternative 1 would avoid direct cultural site impacts from trail building and associated cumulative impacts.

Recreation Management
By not establishing recreation zones, Alternative 1 would encourage dispersed recreational uses that would disturb some cultural sites. Without zones, the irregular and unplanned uses by the public at the Empire Ranch headquarters would continue.

Livestock Grazing
Currently, livestock are fenced from areas where cultural site densities are high and are dispersed where site densities are low. BLM could erect protective fences around sites that livestock might disturb. No grazing in the Empire Mountains would encourage vegetation growth, which might reduce soil erosion at some sites. Class III cultural resource surveys would continue for all grazing improvements, such as livestock tanks and fences.

From Special Designations

Areas of Critical Environmental Concern
By not designating Cienega Creek and portions of Gardner Canyon, Empire Gulch, and Mattie Canyon as ACECs, Alternative 1 could preclude management prescriptions that might help preserve cultural resources in those areas.

Impacts to Cultural and Paleontological Resources from Alternative 2

From Desired Resource Conditions

Watershed: Upland, Riparian, and Aquatic Vegetation Management
Actions proposed for integrated vegetation treatment under Alternatives 2, 3, and 4 would benefit cultural and paleontological resources by increasing vegetation cover and reducing soil erosion at many sites. BLM would conduct Class III surveys to find cultural and paleontological sites in all treatment areas and would design prescriptions to avoid or mitigate impacts.

Implementing the Fire Management Plan would reduce fuels around the buildings at the Empire Ranch headquarters and encourage growth of vegetation that would conserve soil at many cultural sites throughout the planning area. For prescribed burns, BLM would follow guidelines specified under "Requirements for Cultural Resource Inventory of Prescribed Burn Areas," Appendix 5, BLM Handbook H-8120.

Fish and Wildlife Management
Management for priority species and priority habitats would help preserve cultural resources. Actions proposed for fish and wildlife management under Alternatives 2, 3, and 4 would encourage preserving some cultural resources. BLM would conduct Class III surveys to find cultural sites in all treatment areas and design prescriptions to avoid or mitigate impacts.

Cultural Resource Management

Under Alternative 2 the public and the scientific community would benefit from a wide array of educational, interpretive, and research uses at the Empire Ranch headquarters and sites outside the headquarters area. Adaptive reuse of the historic buildings would facilitate their preservation and allow both public and administrative uses. Use of partnership and volunteer labor would allow the public to participate in interesting and unique projects not generally offered elsewhere, while accomplishing tasks to comply with the National Historic Preservation Act and BLM objectives.

Scientific information accumulated from cultural resource inventories and data collection at sites outside the ranch headquarters would contribute knowledge toward understanding human use of the planning area during prehistoric and historic times. Such information would also be crucial to managing the planning area's cultural resources.

Under Alternatives 2, 3, and 4 local communities and residents would have a restored historic site at the Empire Ranch headquarters, to represent their history and development and ranching's contribution to the area. Developing the ranch headquarters would give school groups an unusual, natural and cultural laboratory for studies. The headquarters would also allow students and teachers to intern, join hands-on programs, or conduct studies at the headquarters and planning area

Under Alternatives 2, 3, and 4, visitors to the headquarters would have fully developed facilities with drinking water, restrooms, Americans with Disabilities Act access, shade, and communications. Alternatives 2, 3, and 4 would best meet the desired resource conditions for the headquarters by offering the public more programs while maintaining the historic properties.

Visual Resource Management

Designating a Class II visual management area would help preserve cultural and paleontological resources by prohibiting physical disturbances at some cultural sites. This proposal would help preserve the visual integrity of the historic landscape around the Empire Ranch headquarters because Class II restricts changes to the existing character of the landscape more than VRM Class III under current management.

From Land Use Allocations

Mineral Development

By essentially eliminating locatable and leasable mineral development in the planning area, Alternative 2 would protect the area's cultural and paleontological resources from disturbances of mining.

The activity plans for Alternatives 2, 3, and 4 would eliminate the earth disturbance of gold panning from areas where cultural sites might be harmed.

Utility Rights-of-Way and Land Use Authorizations

Designating two utility corridors across public land in the planning area could damage cultural and paleontological resources in those corridors. But utility lines could be designed to avoid disturbing cultural and paleontological sites, or impacts could be mitigated with data recovery.

Designating utility corridors would confine site impacts to specified linear areas and facilitate impact management, as opposed to widely dispersed impacts that might result with randomly placed corridors. Class III cultural resource inventories would be conducted within each right-of-way corridor and where suitable, ensuring that treatment and mitigation prescriptions would be developed and implemented. Under Alternative 2 disturbance to cultural and paleontological sites

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would be more confined within the corridors than at multiple locations in the planning area.

Off-Highway Vehicle Management

Alternative 2 would limit motor vehicle use on 49,000 acres of public land to designated roads covering 93.9 miles. But some cultural sites would remain vulnerable to impacts from motor vehicles. BLM would conduct Class III cultural resource surveys on existing and future road and trail routes and on roads to be closed and reclaimed. Information collected during these surveys would be used to develop plans for the following:

- Site avoidance or physical protection (dirt or gravel pad).
- Data recovery where roads and trails cannot avoid sites.
- Monitoring for all sites in or near trails and roads.

When needed, BLM could close roads and trails to protect sites. BLM would not create new roads or trails that might disturb or destroy cultural sites. Some areas with significant cultural properties and possible paleontological sites would remain accessible and would continue to have the potential for illegal surface collecting, vandalism, and looting.

Arizona Trail

Under Alternative 2, designating a corridor for the Arizona Trail would disturb some cultural sites and could disturb some paleontological sites. The trail route would be surveyed at a Class III level and, where possible, routed to avoid sites. Data collection or recovery would mitigate any direct impacts from trail building and cumulative visitor use. BLM would routinely monitor sites along the trail to assess and mitigate impacts of trail use.

Recreation Management

Designating recreation Zones 1, 2, and 3 could affect cultural and paleontological resources. In Zone 1 the Empire Ranch buildings would be preserved and interpreted for the public. Land surrounding the buildings would be surveyed at a Class III level, and site impacts would be mitigated by data collection. BLM would manage the buildings and adjacent land according to requirements of the National Historic Preservation Act and the National Register of Historic Places. Designating and managing the headquarters as Zone 1 would benefit cultural and paleontological resources dispersed elsewhere because visitors and facilities would be concentrated at the headquarters. Certain types of visitors would confine all activities to the headquarters rather than the remaining planning area.

In Zone 2 corridors along Oak Tree Canyon and South Road would be surveyed at a Class III level. Data collection or recovery would mitigate impacts. BLM would routinely monitor and assess for mitigation needs the cultural properties and sites along these corridors.

In Zone 3 BLM would survey roads and trails at a Class III level and reroute or close them where they affect cultural sites. Data collection or recovery could mitigate impacts. When needed, fees could be used to mitigate impacts caused by recreation use.

Under Alternatives 2, 3, and 4 a recreation permit system could be used to ensure that visitor levels remain compatible with protecting cultural resources, including the historic ranch headquarters. A fee program, if established as part of the permit system, would supplement objectives for educational and scientific use and preservation of the planning area's cultural and paleontological resources. Fees could also help pay for rehabilitation, maintenance, and adaptive reuse of the Empire Ranch headquarters buildings and also for stabilizing archaeological and paleontological sites throughout the planning area.

Livestock Grazing

Impacts from management of grazing on the Empire-Cienega, Empirita, Rose Tree, and Vera Earl allotments under Alternative 2 would be the same as under Alternative 1. BLM would design grazing management in new allotments in the Empire Mountains to disperse livestock and prevent their congregating where cultural properties might be located. BLM would conduct Class III cultural resource surveys before placing any range improvement structures, such as fences and livestock watering tanks. Such structures would be designed to avoid both direct and cumulative impacts. Exclosure fences could be built around cultural properties to protect them from livestock damage.

From Special Designations

Areas of Critical Environmental Concern

ACEC management in the planning area under Alternative 2 would emphasize protecting and enhancing soil, vegetation, and wildlife. Cultural and paleontological resources in an ACEC would benefit from these prescriptions through increased vegetation cover and reduced soil erosion.

Impacts to Cultural and Paleontological Resources from Alternative 3

From Desired Resource Conditions

Watershed, Fish and Wildlife, Cultural, and Visual Resources Management

Impacts under Alternative 3 would be the same as under Alternative 2.

From Land Use Allocations

Mineral Development

Under Alternative 3 mining could disturb cultural and paleontological resources on 41,000 acres of public land open to mineral location and on 45,859 acres of public land open to mineral leasing. But mining would not disturb cultural and paleontological resources in ACECs. Mines could be designed to avoid some cultural and paleontological properties, and some disturbance could be mitigated with data recovery.

Utility Rights-of-Way and Land Use Authorizations

Impacts to cultural and paleontological resources from utility rights-of-way and land use authorizations under Alternative 3 would be the same as under Alternative 2. Potential impacts and avoidance or mitigation of impacts would apply as under Alternative 2, except that a third utility corridor could disturb more cultural and paleontological sites. A Class III survey would be required on the rights-of-way along Highway 82. Data recovery would be required at all National Register eligible sites that the survey finds and that would be disturbed by installing utility lines.

Off-Highway Vehicle Management

Although the number of miles vary for road closures and restrictions, the impacts and avoidance and mitigation prescriptions under Alternative 3 would be the same as under Alternative 2.

Arizona Trail

Impacts to cultural and paleontological resources from the Arizona Trail under Alternative 3 would be the same as under Alternative 2 except that under Alternative 3 the Arizona Trail would channel people into a narrow corridor having significant cultural resources, subjecting them to looting, vandalism, casual visitor impacts, and illegal surface collecting. Data accumulated by a Class III survey could aid in trail layout and design to avoid directly disturbing sites in this corridor.

These sites would be vulnerable to increased levels of looting, vandalism, illegal surface collecting, and unauthorized visitation.

Recreation Management

Management of uses and impacts to cultural and paleontological resources would be the same under Alternative 3 as under Alternative 2.

Livestock Grazing

Under Alternative 3 livestock grazing would affect cultural resources in the same manner as under Alternatives 1 and 2.

From Special Designations

Areas of Critical Environmental Concern

Under Alternative 3 management prescriptions to enhance soil, vegetation, and wildlife in the Cienega Creek and Nogales Springs ACECs would help protect archaeological sites against soil erosion. Cultural resources would benefit as they would under Alternative 2 because both ACEC proposals would protect riparian areas, where cultural resources tend to be most prevalent.

Impacts to Cultural and Paleontological Resources from Alternative 4

From Desired Resource Conditions

Watershed, Fish and Wildlife, Cultural, and Visual Resource Management

Impacts under Alternative 4 would be the same as under Alternative 2.

From Land Use Allocations

Mineral Development

Impacts under Alternative 4 would be the same as under Alternative 2.

Utility Rights-of-Way and Land Use Authorizations

Potential impacts and avoidance or mitigation of impacts under Alternative 4 would be the same as under Alternatives 2 and 3. But under Alternative 4 potential impacts would be confined to sites in only one utility corridor.

Off-Highway Vehicle Management

Although the numbers of miles would vary for road closures and restrictions, the impacts, avoidance, and mitigation prescriptions under Alternative 4 would be the same as under Alternatives 2 and 3.

Arizona Trail

Under Alternative 4, designating 8 miles of existing road as the Arizona Trail corridor would disturb locations where roads now cross some cultural sites. BLM could reroute the trail to avoid sites, or mitigate impacts by data recovery.

Recreation Management

Management of uses and impacts to cultural and paleontological resources would be the same under Alternative 4 as under Alternatives 2 and 3.

Livestock Grazing

Exclusion of livestock from public lands in the planning area could both benefit and harm the area's cultural and paleontological resources. Eliminating livestock could enhance the growth of vegetation cover and reduce soil erosion at some cultural sites. But cumulative impacts on cultural resources could occur if ranches are subdivided or visitation to the area increases.

Cumulative Impacts on Cultural and Paleontological Resources

Loss of grazing on public lands could result in the failure of adjacent and associated ranch businesses and in turn encourage the sale of adjacent State Trust and private land for residential development. Statistical data collected during the past decades from public land throughout the Southwest shows that illegal surface collecting, vandalism, and looting increase on public land sites as residential development occurs on adjacent and nearby private lands. This process would probably occur should State Trust and private land next to public land in the planning area be developed for residential use. Also, earth moving for residential development could disturb or obliterate significant prehistoric village sites and historic ranch and homestead sites. Such development might change natural drainage systems and cause flooding and loss of cultural sites through stream bank erosion.

Increasing tourism and recreation are trends being experienced in the watershed and beyond as Kartchner Caverns and other developments open. The spinoff effects of such visits to the planning area are unknown but are expected to increase as visitors discover the area and as marketing promotes the Sonoita-Patagonia/Hwy 82-83 loop. As visitation increases to the headquarters, visitation to surrounding communities such as Sonoita would also be likely to increase. Communities and local businesses would benefit economically from increased visitation.

LAND USES

Impacts to Lands and Realty Actions

Scope of Analysis: This section uses impacts on the ability to permit land use authorizations and provide services to compare the impacts of the alternatives on lands and realty actions.

Impacts to Lands and Realty Actions from all Alternatives

From Desired Resource Conditions

Watershed: Upland, Riparian, and Aquatic Vegetation Management

Lack of an integrated vegetation treatment program under Alternative 1 would not affect lands and realty actions. Under Alternatives 2, 3, and 4 proposed vegetation treatments, including prescribed fire, could affect existing and future utility right-of-way facilities. Mitigation measures would need to be adopted to avoid damaging facilities. In addition, applicants for utility right-of-way facilities must be aware of these mitigation measures for the proposed vegetation treatments and how these measures might affect their facilities.

Wildland fire management under all alternatives would help protect facilities from wildfires.

Fish and Wildlife Management

Under all alternatives, protecting threatened, endangered, and sensitive plants and animals could impede the installing of new right-of-way facilities or could increase development costs due to mitigation. BLM might have to require mitigation to avoid harm to priority species or prevent jeopardizing the existence of endangered or proposed species. If a proposed right-of-way facility cannot be installed within the proposed right-of-way corridors without harming a priority species, an alternative right-of-way corridor might have to be selected for the proposed use. If the impacts could not be mitigated, BLM might have to deny the application.

Under all alternatives, proposals to remove or modify rights-of-way would be difficult and expensive for the holders and have significant adverse economic and social impacts. According to regulations 43 CFR 2800, the right-of-way holder can continue to renew its right-of-way under the original terms of the right-of-way grant. BLM cannot terminate a right-of-way grant unless (1) the holder has violated the terms of the grant and refuses to correct the violation or (2) the right-of-way is no longer needed. As possible mitigation, BLM could suggest to the holders that they modify and move their facilities. Then only with the holder's permission could BLM modify the right-of-way grant to reflect changes from the original right-of-way plan of development, terms, and stipulations.

Removing existing roads could harm right-of-way users who use the subject roads to gain access to their facilities. Mitigation would need to ensure that holders have another road for reaching and servicing their facilities.

Cumulative Impacts: The listing of more threatened and endangered species would further restrict site availabilities and options for land use and right-of-way authorizations.

Visual Resource Management

Under all alternatives, BLM would consider visual resources in developing and analyzing rights-of-ways or other land use proposals. Designating public lands as VRM Class III under Alternative 1 would less restrict land use proposals than the more restrictive VRM Class II under Alternatives 2, 3, and 4. BLM would require mitigation to preserve existing visual resources. Such preservation would increase development costs.

Cultural Resource Management

Under all alternatives the discovery of any cultural sites could delay or preclude the installing of a right-of-way facility. Mitigation needed to avoid damaging the site would increase development costs. Should mitigation prohibit the installing of a new facility, an alternative right-of-way corridor would be used. Otherwise, BLM would have to deny the application.

From Land Use Allocations

Mineral Development

Any mineral development under Alternatives 1 or 3 would likely result in requests for utility rights-of-way or other land use permits to service the mining facilities. Opening up the most area to mining, Alternative 3 would be most likely to cause these impacts.

Utility Rights-of-Way and Land Use Authorizations

BLM must be able to meet the needs and provide the services required by utility companies now and in the future. The designated utility corridors within the planning area under Alternatives 2, 3, and 4 respond in varying degrees to the expected increase in future right-of-way requests, which would be driven by economic and social factors. With the deregulation of the utility industry increasing demands for more interstate and intrastate utility routes are likely. The increase of regional developments on adjacent private lands, State Trust Lands, and neighboring cities outside the planning area would bring a need for the utility industry to accommodate consumer needs. The proliferation of utility routes crossing the public lands in the planning area might be attributed to the capacity restrictions on existing major utility corridors along Interstate 10 and through State Trust and Forest Service lands.

Once existing utility corridors reach their capacities, later utility routes would look more to using the designated corridors proposed in this plan. Alternative 4 would provide the fewest routing options with only one corridor. Alternative 2 would provide a moderate level of routing options with two corridors. Alternative 3 would provide the highest level of routing options with three corridors. Because the BLM- managed land crossed in these utility corridors is such a small percent of the total, the ability to obtain rights-of-ways across adjoining State Trust Lands might have more impact than obtaining rights-of-ways across public land.

Off-Highway Vehicle Management

Motor vehicle travel on utility easements or access routes under all alternatives might result in conflicts between users and utilities over damage to facilities and liability concerns.

Road Designations

Road closures and restrictions under Alternatives 1 and 3 would not affect lands and reality actions.

Under Alternatives 2 and 4 road closures might conflict with access routes used by utility rights-of-way holders and with proposed utility facilities. Proposed closures could be mitigated by not allowing the closing of any roads or trails used to access utility rights-of-way. BLM would need to grant administrative access for all authorized users. Fewer roads closed would impose fewer access restrictions on right-of-way holders.

Recreation Management

The designation of recreation zones would not affect lands and realty actions under any of the alternatives.

Arizona Trail

Under Alternatives 2, 3, and 4 the use of the Arizona Trail could conflict with access routes being used by utility right-of-way holders. Any new trails or roads built for the Arizona Trail could be mitigated by not allowing the trail to interfere with a right-of-way holder's facilities, maintenance, and access. Designating the Arizona Trail would require access authorization from El Paso Gas Co. to cross its gas line property, which runs through public lands in the planning area.

Livestock Grazing

Livestock grazing management would not affect lands and reality actions under any of the alternatives.

From Special Designations

Areas of Critical Environmental Concern

ACEC designation would not affect lands and realty actions under Alternatives 1, 2, and 4. Designating an ACEC could conflict with the proposed right-of-way utility corridor and existing rights-of-way on public lands in two sections:

T.18 S., R. 17 E., sec 12;
T.18 S., R. 18 E., sec 7

Cumulative impacts: The ACEC designation for sensitive species and resources would more greatly restrict the availability of sites and allow fewer options for providing land use and right-of-way authorizations.

Impacts to Mineral Development

Scope of Analysis: This section uses the acreage open to potential mineral exploration and development to compare the impacts of the alternatives on mineral development.

Impacts to Fluid Mineral Leasing

Impacts to Fluid Mineral Leasing from Alternative 1 (Current Management)

The planning area contains lands that are prospectively valuable for oil and gas. This area represents about 5% of the land in southeast Arizona (Cochise, eastern Pima, and Santa Cruz counties) that is prospectively valuable for oil and gas. About 48,542 acres (88 %) of BLM-managed land and mineral estate prospectively valuable for oil and gas are not open to mineral leasing under current management.

The original public domain lands (458 acres) and split-estate lands (5,914.6 acres) are open to fluid mineral leasing under current management. This acreage represents 12 % of the public land mineral estate. BLM considers lease applications and permits to drill on a case-by-case basis. About 25,000 acres of the Cienega Basin that is prospectively valuable for oil and gas is open to fluid leasing on the State Trust Lands, which are managed by the Arizona State Land Department. Therefore under current management 40% of the Cienega Basin that is prospectively valuable for oil and gas is open to mineral leasing, and 60% is closed.

Cumulative Impacts of Alternative 1 (Current Management) on Fluid Mineral Leasing

Cumulative impacts to the oil and gas industry are expected to be nominal given the limited interest in the basin during the past 60 years. Alternative 1 does not affect geothermal resources because the planning area is not prospectively valuable for geothermal energy.

Impacts to Fluid Mineral Leasing from Alternative 2

Alternative 2 would close split-estate and public domain lands to mineral leasing, increasing the planning area acreage closed to leasing by 6,373 acres, a 12% increase from Alternative 1. A total of 54,915 acres would be closed. As a result, 70% of the planning area that is prospectively valuable for oil and gas would be closed to fluid mineral leasing.

Cumulative Impacts of Alternative 2 on Fluid Mineral Leasing

Cumulative impacts under Alternative 2 would be the same as under Alternative 1.

Impacts to Fluid Mineral Leasing from Alternative 3

Under Alternative 3, a total of 51,774 acres of public land and public mineral estate in the planning area would be open to fluid mineral leasing subject to standard lease terms and conditions. Only lands within the Appleton-Whittell Research Ranch (3,140 acres) would remain closed to mineral leasing. The area open to mineral leasing would increase by 45,401 acres (84%) over current acreage (Alternative 1). About 77,000 acres or 96% of the planning area that is prospectively valuable for oil and gas would be open to fluid mineral leasing.

Areas of critical environmental concern (ACECs) would be subject to no surface occupancy. Permittees would have to directionally drill to targets that might be located beneath the ACEC, increasing drilling costs.

Cumulative Impacts from Alternative 3

Alternative 3 would open the entire Cienega Basin to fluid mineral leasing, increasing the area in southeast Arizona that is prospectively valuable for oil and gas by about 5%. An increase in exploration, however, is not expected in the foreseeable future.

Impacts to Fluid Mineral Leasing from Alternative 4

Alternative 4 would affect fluid mineral development the same as would Alternative 2.

Overview

Alternative 1 would help meet the goals and objectives for the planning area by limiting oil and gas exploration to a few scattered tracts of land throughout the planning area. Alternatives 2 and 4 would meet the goals and objectives more immediately by not allowing any oil and gas exploration within the planning area. Alternative 3 would not meet the goals and objectives in the short term because oil and gas activity would disturb upland vegetation, upland wildlife, scenic beauty, and watershed health. Only in the long term, after reclamation has erased the impacts, could the goals and objectives be maintained.

Impacts to Locatable Minerals

Impacts to Locatable Mineral Development from Alternative 1 (Current Management)

Under current management all acquired public lands (48,542 acres) are closed to mineral location. This acreage represents 88% of the federal mineral estate in the planning area. This closure prohibits mineral exploration in more than 33% of the

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planning area. About 5,900 acres of split-estate lands and 458 acres of public lands in the Empire Mountains (12% of the federal mineral estate in the planning area) are open to mineral location. State Trust Lands are also open to mineral exploration and development as authorized by the State of Arizona. Therefore 65% of the planning area is open to mining, either on federal mining claims or state leases.

Impacts to Locatable Mineral Development from Alternative 2

Alternative 2 would close all public lands and split-estate lands to mineral location, removing 6,373 more acres of land from locatable mineral exploration, a 12% increase in closed area from current management (Alternative 1). Limiting mineral exploration to State Trust Lands would prevent exploration for high-purity limestone on the southeast side of the Empire Mountains and also prevent exploration for copper in 40% of the planning area. The one known deposit of limestone on federal lands within the planning area is under mining claims owned by the Georgia Marble Company. Therefore, the right to mine the deposit would be protected unless Georgia Marble drops the claims.

Cumulative Impacts of Alternative 2 on Locatable Mineral Development

Several high-purity limestone deposits are known to occur in southeast Arizona. At least seven have been mined in the past, and four are still being mined. Therefore, closing the Empire Mountains would not prevent the mining of this important resource, and the cumulative impacts to the limestone industry would be slight. The cumulative impact to the copper mining industry under Alternative 2 would also be slight because the industry has not shown an interest in exploring for copper in the Cienega Basin and Empire Mountains for the last 30 years. Moreover, no interest is expected for the foreseeable future.

Impacts to Locatable Mineral Development from Alternative 3

Alternative 3 would open all public lands to mineral location except lands within areas of critical environmental concern, including the Appleton-Whittell Research Ranch. Alternative 3 would open up 40,509 more acres (74% more land) to exploration for locatable minerals than would Alternative 1. Combined with the split-estate lands, lands open to location would amount to 46,882 acres (85% of the federal mineral estate in the planning area). About 95% of the planning area would then be open to mining on either federal mining claims or state leases. This would be an increase in area open to mining of about 30% from current management (Alternative 1).

Cumulative Impacts to Locatable Mineral Development from Alternative 3

More land would be open to mineral location in southeast Arizona. Exploration and mining are not expected to increase much in the foreseeable future.

Impacts to Locatable Mineral Development from Alternative 4

Alternative 4 would have the same effect on locatable mineral development as would Alternative 2.

Overview

Alternative 1 would help meet the goals and objectives for the planning area by limiting mining to a few scattered tracts throughout the planning area. Alternatives 2 and 4 would meet the goals and objectives more immediately by not allowing any mining on public lands within the planning area. Alternative 3 would not meet the goals and objectives in the short term because mining would create direct adverse impacts to water quantity, upland vegetation, upland wildlife, scenic beauty, and watershed health, and indirect adverse impacts to water quality and aquatic life. Only in the long term, after the disturbances have been reclaimed, could the goals and objectives be maintained.

Impacts to Salable Minerals

Impacts to Salable Mineral Development from Alternative 1 (Current Management)

BLM does not grant sales of mineral materials on public lands within the planning area. The urban growth centers of Tucson and Sierra Vista obtain their sand and gravel from sources closer to home. Therefore, closing the planning area to salable mineral development is not affecting the supply of sand and gravel for Tucson and Sierra Vista. Moreover, no one has shown an interest in mining sand and gravel in the planning area. Mineral material sales on private surface split-estate lands can be sold only to the surface owner.

Impacts to Salable Mineral Development from Alternative 2

The impacts to salable mineral development under Alternative 2 would be the same as under Alternative 1.

Impacts to Salable Mineral Development from Alternative 3

Under Alternative 3 BLM would not authorize mineral material sales within areas of critical environmental concern, including the Appleton-Whittell Research Ranch but would authorize them on other public lands in the planning area. This authorization would open up 40,509 more acres to mineral material sale applications for a total of 46,882 acres of public lands and public mineral estate. BLM would analyze mineral material applications on a case-by-case basis, and sales on the 4,474 acres of private surface split-estate lands would be limited to the surface owner.

Cumulative Impacts of Alternative 3 on Salable Mineral Development

Opening BLM lands to saleable minerals would provide many sources of sand and gravel to the mining industry. BLM expects little interest in sand and gravel sales in the planning area in the foreseeable future because of prohibitive haul distances to markets. For future road construction on Highways 83 or 82, the Arizona Department of Transportation might need to find material sources within the planning area.

Impacts to Salable Mineral Development from Alternative 4

The impacts to salable mineral development under Alternative 4 would be the same as under Alternative 1.

Overview

Alternatives 1, 2, and 4 would help meet the goals and objectives by closing the public land portion of the planning area to sales of mineral materials. Alternative 3 would not meet the goals and objectives in the short term because mineral material sales would harm upland wildlife, upland vegetation, scenic beauty, and native plant diversity and abundance in the short term. In the long term, after mining has ceased and the site has been reclaimed, the objectives and goals could be met.

Recreational Mining

Impacts to Recreational Mining from Alternative 1

Alternative 1 would not affect recreational mining.

Impacts to Recreational Mining from Alternatives 2, 3, and 4

Prohibiting the public from recreational mining (gold panning, dredging, sluicing) in the areas of critical environmental concern would effectively close off Cienega Creek and many of its tributaries to recreational mining. But this prohibition would little affect recreational mining because currently and historically recreational mining has occurred on national forest lands around Greaterville, where there are known occurrences of placer gold.

Impacts to Livestock Grazing

Scope of Analysis: This section uses the acreage open to grazing, allowable use levels, and other constraints to compare the impacts of the alternatives on livestock grazing.

Impacts to Livestock Grazing from Alternative 1 (Current Management)

Alternative 1 would maintain ranching operations on public lands in the four allotments where families are employed in rural agriculture (Empire, Empirita, Vera Earl, and Rose Tree ranches) at least for the next 10 to 20 years. Currently livestock do not graze BLM-administered lands in the Empire Mountains.

That BLM has no coordinated public outreach for the public lands in the planning area and does little to reduce the harm of growing recreation use on livestock operations or to explain the benefits of preserving rural lifestyles, traditional uses, and open space.

On the Empire-Cienega allotment, variable stocking rates under a flexible grazing system result in variable net cash returns to the grazing permittee. Variable stocking rates also result in variable grazing receipts for BLM.

Cumulative Impacts to Ranching and Livestock Grazing from Alternative 1 (Current Management)

The Sonoita Valley area is shifting from a rural to suburban economy. Recreation and ecotourism uses of the public lands are rapidly increasing. As urban centers continue to expand, the Sonoita-Elgin area is attracting people who want to escape the sprawl of cities. Recreation on public lands is continuing to increase in the planning area with very little regulation or constraint on its growth.

The increase in visitors and their diverse activities would continue until it is no longer feasible or suitable to graze cattle. Visitors are leaving gates open, vandalizing improvements, and starting wildfires. Roads must be maintained more often. The cumulative effect of these impacts is to increase the labor and capital outlay of the ranchers. The operations become less viable. Also, as the number of people recreating on the public lands continues to increase, the direct conflicts between people and livestock would increase. Recreation development under Alternative 1 would continue to increase until livestock grazing is not feasible.

The shift from a rural agricultural-based economy to a residential and service-related ecotourism economy would continue. The private lands would continue to be sold for residential and business development, decreasing the amount of open space for ranching. As private lands are sold off, the demand for more subdivision property next to the protected public lands would increase the demands for the State Land Department to sell State Trust Lands for development. Agricultural uses could not afford to compete with residential development in purchasing the lands. The trend would be toward less land for rural uses such as livestock grazing.

Impacts to Ranching and Livestock Grazing from Alternative 2

Alternative 2 would maintain ranching operations on public lands in four units where families are employed in rural agriculture for the next 10-20 years. In addition, it would create a new grazing allotment on public lands in the Empire Mountains and could generate personal income of more than $1,700 and $300 in grazing receipts on this allotment.

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Implementing flexible grazing systems on all the allotments would result in variable stocking rates, cash returns, and grazing receipts.

To conduct their business livestock operations rely on water from streams and wells on lands with various owners and on various land use permits, including access, utilities, and grazing leases. Under Alternative 2 operators would continue to obtain these authorizations on public lands. There are currently few restrictions on drilling new wells. As they develop riparian pastures, ranchers must obtain authorizations to develop and use alternative water sources in the adjacent uplands. Resource conflicts would be resolved through the National Environmental Policy Act (NEPA) process and the biological planning process.

Alternative 2 would implement a coordinated outreach strategy. BLM would interpret the area for its values and uses and disseminate this information to the public through an outreach plan. This plan would educate the public and improve the public's understanding and knowledge of proper use. This outreach would include explaining the benefits of preserving rural lifestyles, traditional uses, and open space.

The proposed ACEC should raise public awareness of the importance of the planning area and its sensitive resources and help in obtaining increased levels of funding to acquire the inholdings. The inholdings would better protect resources that support grazing operations.

Cumulative Impacts of Alternative 2 on Livestock Grazing

As described for Alternative 1, the shift from a rural agricultural-based economy to a residential and service-related ecotourism economy would continue under Alternative 2. Acquiring private land inholdings could reduce the amount of open space lost in the planning area. Otherwise, owners could sell these lands for residential and business development, decreasing the amount of open space for ranching. BLM's acquisition or protection of State Trust Lands would greatly benefit the protection of all resources and uses in the planning area, including grazing operations for the long term. Agricultural users could afford to obtain use authorizations on the acquired properties. The trend would be toward more land for rural uses such as grazing.

Recreation and ecotourism are rapidly increasing on the region's public lands. As urban centers continue to expand, the Sonoita-Elgin area would attract people who want to escape urban sprawl. Recreation uses on public lands would continue to increase up to the capacity of the zones.

Impacts to Ranching and Livestock Grazing From Alternative 3

Alternative 3 would also maintain ranching operations on public lands in four allotments where families would be engaged in rural agriculture for the next 10-20 years. In addition, Alternative 3 would create a new grazing allotment on public lands in the Empire Mountains. This allotment could generate personal income of more than $1,700 and $300 in grazing receipts. Grazing operators could still obtain the permits and authorizations to conduct their operations.
Establishing fixed conservative stocking rates for the allotments could reduce incomes due to fewer available AUMs. But incomes could be slightly more stable since stocking rates would not be as variable. Also, BLM would lose a small amount of revenue in grazing receipts. Alternative 3 would create a new grazing allotment in the Empire Mountains. This allotment could generate personal income of more than $1,700 and $300 in grazing receipts.

Cumulative Impacts of Alternative 3 on Livestock Grazing

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Cumulative Impacts under Alternative 3 would be similar to those under Alternative 2.

Impacts to Ranching and Livestock Grazing From Alternative 4

Alternative 4 would eliminate ranching operations on public lands in the four allotments where families are employed in rural agriculture (Empire, Empirita, Vera Earl, and Rose Tree ranches). Currently livestock do not graze on BLM-administered lands in the Empire Mountains. Alternative 4 would result in the loss of more than $129,000 in personal income on the Empire-Cienega allotment and a loss of federal grazing receipts. This loss would reduce funding for rangeland improvements.

BLM would be required to fence the public lands to keep livestock grazing adjacent lands out. About 110 miles of fencing would be needed at a cost of $555,000.

In addition to the required fencing, BLM would have to assume responsibility for maintaining the new fencing and the existing boundary fencing. BLM's experience in managing the San Pedro Riparian National Conservation Area also shows the need for hiring more staff to detect and resolve unauthorized grazing.

Cumulative Impacts of Alternative 4 on Livestock Grazing

Under Alternative 4 BLM would likely sell the State of Arizona livestock grazing leases on the Empire-Cienega and Empirita ranches to the private sector. Well permits and water rights on the public lands obtained for livestock grazing would need to be relinquished or abandoned and new applications filed. The wells not being used for wildlife or recreational purposes would need to be abandoned and sealed. Water rights on the State Trust Lands would probably have to be sold with the grazing leases.

Alternative 4 would hasten the trend away from a rural society. The four families would no longer derive income from livestock produced using forage from the planning area's public rangelands. Cancelling the grazing authorizations would seriously affect the Empire-Cienega and Rose Tree ranches. The public relations of eliminating livestock grazing on public lands would contribute to and probably hasten the elimination of livestock grazing on other properties.

As the agricultural nature of this area is lost, more pressure would come to bear on the State of Arizona to sell the State Trust Lands, which would likely soar in value due to the closeness to the federally protected resource lands. The sale of State Trust Lands would increase the residential construction, removing open space and native vegetation at a faster rate.

Impacts to Outdoor Recreation

Scope of Analysis: This section uses changes in recreation opportunity settings, corresponding changes in recreation experiences, and changes in access to compare the impacts of the alternatives on outdoor recreation.

Impacts to Outdoor Recreation from Alternative 1 (Current Management)

From Desired Resource Conditions

Watershed: Upland, Riparian, and Aquatic Vegetation Management

The lack of planned and integrated upland, riparian, and aquatic vegetation management under Alternative 1 might over the long term detract from natural and semi-primitive recreation settings, particularly if plant invasions (both native and exotic) detract from some visitors' expectations of the area's scenery. Some short-term impacts to these settings and associated recreation experiences would be expected from vegetation treatments that BLM might authorize on a case-by-case basis.

Fish and Wildlife Management

Current wildlife management enhances most recreation activities as shown on the register sheets collected over the past 10 years. Viewing wildlife was among the highest desired recreation activities reported. Hunting opportunities are high under current management, but the number of hunting opportunity comments received was lower than the number of wildlife viewing opportunity comments received.

Visual Resource Management

A Class III VRM designation under current management could affect visual resources and the overall viewshed in the long term because Class III allows for some modification to the existing character of the landscape and could harm existing recreation opportunity settings, particularly with reductions in naturalness. Currently a mostly natural appearing environment can be viewed from popular vantage points such as portions of the main scenic highway and from most of the planning area roads and the ranch headquarters. Some current visual intrusions are power lines, dirt tanks, fences, roads, trails, a kiosk, and an airstrip. These intrusions slightly reduce visual quality but are generally consistent with Class III.

Cultural Resource Management

Under current management, the historic ranch headquarters offers opportunities for sightseeing and discovering the past and often becomes a focal point for most visitors and commercial tour guides. Currently, BLM gives visitors only a limited interpretation of the site. Gradual deterioration of historic structures and contents due to vandalism and weathering diminishes the quality of this recreational setting by creating health hazards and loss of the site's character. Alternative 1 lacks a comprehensive cultural interpretation program that could improve tourism needs while protecting the resource.

From Land Use Allocations

Mineral Development

Mineral development on public lands open to mining could change current recreation opportunities and visitor access, causing a loss of more primitive recreation experiences and scenic qualities. Motor traffic and road maintenance requirements could later increase, and some road conditions would change.

Mineral development conflicts with the more primitive to semi-primitive motorized recreation in a mostly unmodified or natural appearing environment. Current recreation opportunities offer shared backcountry roads from two paved state highways (Highway 82, 83) for motor vehicles, hikers, and horseback riders for day excursions, camping, and sightseeing. Potential new service roads for mineral development could provide motorized access points to previously inaccessible areas for sightseeing, casual recreation, exploration, and hunting

But many roads to mineral development sites restrict visitors. So motorized recreational use on new service roads could be limited, and some roads open to motorized recreation could be closed. Any roads that are shared with mineral development use might be more hazardous for motorists due to frequent encounters with larger mining vehicles.

Other recreation users, such as backpackers and hikers seeking more solitude, would benefit from restricted motorized access because it would reduce encounters with other visitors and their activities. But encounters with mining vehicles and activities would increase on service roads and at mines. Mineral development could change current opportunities and settings from a primitive experience and semi-primitive motorized experience to rural. (See Recreation Opportunity Spectrum in Chapter 2.)

Rights-of-Way

Utility rights-of-way and land use authorizations on public lands could change current recreation opportunities and visitor access, causing a loss of more primitive recreation experiences and scenic qualities. Motor traffic and road maintenance requirements could later increase, and some road conditions would change.

Several existing utility rights-of-ways contain service roads used by visitors as access points. Even though Alternative 1 would designate no utility corridors, BLM might authorize new rights-of-way access in areas that provide primitive to semi-primitive motorized recreation opportunities. These access points for rights-of-ways could both benefit and reduce recreation opportunities. Improved access could increase visitors, providing more opportunities for motorized recreation but diminishing solitude and primitive experiences for others.

For example, unauthorized access points might increase for BLM lands. Some recreation users that gain legal access usually expect to see little or no traffic in the backcountry. But visitors accessing unauthorized points in the backcountry could degrade the legal-entry visitor's expectations of solitude and self-reliance in the more primitive areas.

Most service roads are popular unauthorized access points (under BLM policy) to the backcountry. Even with Tread Lightly or other OHV education campaigns to follow rules and respect posted signs, many visitors continue to use unauthorized roads. The challenge for the utility companies and BLM is as follows:

- To gain more public support for these rules.
- To close unauthorized access points while allowing for utility service.
- To hire people to monitor and enforce random unauthorized access into remote areas.

OHV Management

Current off-highway vehicle management has disturbed natural and more primitive recreation settings and opportunities.

Current management restricts motor vehicles to designated roads. But BLM has only partially implemented this designation, and motorized vehicles generally travel on the existing roads and trails. Over the past 10 years visitors have illegally created many roads, and repeated use has made them permanent. Since no universally accepted definition exists for an existing road or trail, enforcement to prevent illegal use of roads is difficult.

Visitors often created these roads, wanting a more primitive setting and seeking more solitude. But illegal off-road travel often crushes vegetation, harms wildlife species and habitats, and results in loss of ground cover from campsites, fire rings, and trash accumulation.

Currently, most roads are open to all users, and conflicts arise when expectations for use of roads are not met. Potentially conflicting recreation opportunities are promoted on shared use roads, such as when horseback riding is promoted on the same road that leads to an off-highway vehicle destination area. Whether or not conflicts arise, brochures and other marketing information often promote a wide variety of recreation uses that can either deter or encourage visitation by different users.

The current road numbering system generally benefits visitors by allowing quicker emergency help and reducing chances of getting lost. Road numbering also helps law enforcement (BLM, sheriff, Game and Fish) regulate off-highway vehicle traffic. Several unnumbered or unsigned roads exist and complicate law enforcement and send mixed messages to users on what roads are legal. Some disadvantages of road numbering can include inadvertently directing visitors to sensitive wildlife habitat and cultural areas not signed in the past. Road numbering can give some visitors a false sense of security. Road numbering and maps can also lessen more primitive recreation experiences by directing new traffic to formerly low-use areas.

Arizona Trail

Under current management, not designating a corridor for the Arizona Trail means that the planning area would have one less highly desired nonmotorized trail. No Arizona Trail designation also means that a cumulatively large (500+ visitors a year) target audience is not attracted to the area. And visitors might create random social trails for the lack of a single marketed designated trail. (A social trail is an unplanned random trail made by initial visitors and then followed by others).

Recreation Management

Under current management, the lack of designated recreation zones allows for continual random campsite creation and dispersed recreational use throughout the entire planning area. Gradually changing recreation settings (due to increased visitor use) in the short and long term and the lack of consistent identified recreation expectations and opportunities (often called niches or classifications) to promote or offer to the public makes management increasingly difficult.

Therefore, the recreation resources promoted as a whole would remain indefinite and would continue to contribute to the increase of conflicts among recreationists and other public land users. This conflict could gradually lead to greater damage to vegetation, wildlife, grazing opportunities, cultural resources, and recreation opportunities.

The lack of recreation zones under current management is favorable for some recreation users who perceive that their desired activities can continue indefinitely. But over the long term all recreationists' opportunities and experiences might change with increased, relatively unplanned recreation use.

Livestock Grazing Management

Generally, livestock grazing coexists with most recreation use in the area with relatively few impacts. But livestock grazing issues and impacts to recreation depend on individual expectations and knowledge of the area's grazing practices. Safety and health issues can be a concern. In extreme cases cattle can harm people by charging. Other health concerns include contaminated water sources and insect pests from cattle waste. Camping in areas with cattle can detract from a high-quality recreation experience. But some visitors are not concerned about cattle at their campsites. The presence of cattle can enhance some visitor experiences because it is one of the niches promoted by tourism offices as an "Old West Theme " area and adds to the historic ranch atmosphere. Visitors often use trails created by cattle for hiking, bicycling, and horseback riding and also use water sources created for cattle.

Inconsistent promotion of recreation in the area without always explaining the grazing program can create differing expectations and reactions by visitors upon arrival. The lack of an effective interpretation program under current management adds to mixed qualities of recreational experiences when visitors encounter cattle operations.

From Special Designations

Areas of Critical Environmental Concern

Lack of any other ACEC designations under current management might slightly lower the quality of the recreation opportunity settings because sensitive resources might be at greater risk of being degraded.

Impacts to Recreation from Alternative 2

From Desired Resource Conditions

Watershed: Upland, Riparian, and Aquatic Vegetation Management and Fish and Wildlife Management

The proposed actions for watershed, upland, riparian, and fish and wildlife management enhance the overall recreation settings and opportunities, but specific proposals may degrade some recreation opportunities and settings.

Some traditional campsites along Cienega Creek would be lost, but these campsites did not conform to the Leave No Trace ethics of camping too close to water. Restricting camping to areas 100 feet or more from water would increase wildlife viewing opportunities and improve vegetation and water quality conditions, desirable for most visitors. Limiting nonmotorized and motorized crossings of Cienega Creek for permitted group activities would concentrate impacts at designated crossings. Large groups would lose some sightseeing opportunities in the riparian zone. Vegetation treatments such as prescribed fire might degrade recreation settings in the short term. In the short term, visitors would benefit from the presence of fuel wood, and the removal of unwanted fuel wood tree stumps would improve visual resources. Recreation opportunities and settings, such as wildlife viewing and hiking in more natural appearing settings, would improve in riparian areas.

Visual Resource Management (VRM)

VRM Class II is the same classification required in many wilderness areas, where fewer alterations to the landscape can be allowed. Designating this classification on the public lands within the planning area would moderately affect past and future recreation developments. The Class II designation would help maintain desired recreation opportunities and settings, including a more natural appearing and primitive recreation setting.

Cultural Resource Management

Enhancing cultural resources through an interpretive and educational program and structure stabilization, especially at the Empire Ranch headquarters, would satisfy and direct most visitors to that area and would reduce impacts to backcountry areas that are intended to be more primitive to semi-primitive.

From Land Use Allocations

Mineral Development

Alternative 2 would eliminate potential impacts from mineral development under Alternative 1 if no valid existing claims are developed.

Prohibiting recreational mining in riparian areas would eliminate one potential form of recreational activity. But the prohibition would help maintain the resources and conditions that provide existing primitive and semi-primitive opportunities and settings for other visitors. Most recreational mining occurs in the Santa Rita Mountains in Coronado National Forest and would not be affected by this proposal.

The administrative use of mineral material would reduce the cost of most recreation projects, including road maintenance designed to protect resources while allowing recreational use.

Utility Rights-of-Way and Land Use Authorizations

Designating utility corridors should minimize the degrading of visual resources at recreation settings by utility developments and minimize conflicts of recreation use of utility access routes. Establishing a utility corridor next to the existing El Paso Gas line could perpetuate the need for the existing access road and further increase impacts from recreation use of this road. Continued recreation use of the service road would remain a constant challenge to maintain the more primitive recreation settings and opportunities.

Off Highway Vehicle Management

Fully implementing the *limited to designated* roads designation would create a wider variety of recreation opportunities and reduce user conflicts. Some roads proposed for closure would allow nonmotorized use such as horseback riding and hiking without sharing the routes with motor vehicles. Nonmotorized routes are in demand, and this designation would reduce the need to build new nonmotorized routes and lessen recreation conflicts. Overall, this designation would prevent negative impacts to desired recreation opportunities and natural resources.

Assigning numbers to roads that have been previously unsigned could give a false perception of safety and might direct unprepared visitors to rough backcountry roads. To avoid this pitfall, BLM would also need to sign road conditions. Intrusive road signs could slightly degrade Class II visual resource management classifications and have a slight effect on recreation settings.

Arizona Trail

Designating a corridor for the Arizona Trail would give the planning area a highly desired nonmotorized trail and help reduce user conflicts on shared motorized-nonmotorized routes. The Arizona Trail might attract a cumulatively large (500+ a year) group of visitors to the area. This single marketed designated trail might reduce the creation of random social trails. An indirect impact might be the non-recreation use of the trail, such as by undocumented immigrants or persons involved in illegal border activities. This use in turn might increase trash, erosion, and human waste at large camps and degrade recreational settings and experiences.

Recreation Management

Establishing an individual recreation permit system would help preserve existing recreation settings and opportunities while recreation demands increase by addressing the area's recreation capacities. The option of a fee program could have several impacts:

- Recreation infrastructure proposals might not meet Land and Water Conservation Fund criteria for setting up fees for use of the entire area.
- Fee collections require more on-the-ground staff for compliance with Titles 36 and 43 of the Code of Federal Regulations.
- Overseeing a fee collection system could cost more than the actual fees recovered.

Establishing fees for a permit system could either dissuade or attract visitors. Those not wanting to pay the fees might choose to recreate elsewhere. Others might view the fees as an indication of the presence of a desirable recreation infrastructure. The planned recreation infrastructure might not meet the expectations of some of these visitors. The collected fees can be reinvested at the site of collection to mitigate recreation-related resource impacts and build and maintain recreational developments. Collected fees could be used to pay for a recreational land use permit from the Arizona State Land Department for public recreation on State Trust Lands. Such a permit would help reduce current confusion and issues of intermixed lands with differing mandates and management.

The proposed recreation zone classifications under Alternative 2 could create a wider variety of recreation opportunities and settings. Zones 1 and 2 would protect natural resources more than they are protected now and would enhance recreation settings. Zone 3 might undergo an increase of use if campsite demands exceed designated sites in

Zone 2. Law enforcement needs are expected to increase because there would be more restrictions to enforce.

All three recreation zones would allow some development to protect resource conditions. Such development could include providing a hardened surface. At Maternity Well, the option of installing a graveled parking lot would slightly alter the current recreation setting. Gravel might be an undesirable surface for most group overnight and day use, but it could keep dust from blowing. Gravel, pavement, or other surface hardening should be viewed as a last resort to mitigate recreation impacts. If erosion is occurring, BLM should first consider other light-handed methods in order to maintain more natural settings.

Under Alternative 2 recreation zone prescriptions, individual visitors would not be able to use the new Maternity Well site, which would be limited to groups under permit. Individual users who have been displaced from a traditional use area would most likely move to Zone 3 close to the main highways and roads or on other non-BLM areas. Displaced users of the northeast corner of old Agricultural Fields would not be harmed as much as individual Maternity Well users because the Agricultural Fields site has not been used as much as the Maternity Well site. Other designated group areas open to individual or casual use when not reserved by a group would slightly increase in use.

It is legally difficult to remove an individual camper if a group event is scheduled at the same time the individual is present. BLM must post a notice on the site at least 2 weeks in advance to advise individual campers of upcoming reserved site status. Closing off a reserved area would require more management intervention with a reservation system, opening and closing of the site, and on-site people to monitor the campsites.

Zone 2 areas would more restrict campsite selection than Zone 3 areas because Zone 2 prescriptions require use of designated camping areas. But this requirement can assure a consistent dispersed camping experience during times of high visitor use. In designated camp areas, newly arrived campers are less likely to infringe on the camping space picked out by an already present visitor. Such infringement is more likely in Zone 3. If the number of designated campsites remains low, a primitive to semi-primitive motorized experience can be maintained. Sites would fill quickly during high use and would require more monitoring for compliance.

Livestock Grazing

Impacts to outdoor recreation from Alternative 2 grazing proposals would be similar to those under Alternative 1. Creating a new grazing allotment would expand potential conflicts between grazing and visitors to the Empire Mountains. Alternative 2 would bring recreational users into the biological planning process, which should help reduce conflicts.

From Special Designations

Areas of Critical Environmental Concern

The ACEC designation would benefit primitive and semi-primitive recreation opportunities and settings by maintaining and protecting the sensitive resources in these areas.

Impacts to Recreation from Alternative 3

From Desired Resource Conditions

Watershed, Fish and Wildlife, Cultural, and Visual Resources Management

Impacts under Alternative 3 would be the same as under Alternative 2.

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From Land Use Allocations

Mineral Development
Mineral development under Alternative 3 would have the same type of impacts on recreation as under Alternative 1. But under Alternative 3 these impacts could occur on a much larger scale and could be much greater.

Utility Rights-of-Way
Impacts under Alternative 3 would be similar to those under Alternative 2, but under Alternative 3 they might occur over a larger area because of the third utility corridor.

Off-Highway Vehicle Management
Impacts under Alternative 3 would be the same as under Alternative 2.

Arizona Trail
Impacts under Alternative 3 would be the same as under Alternative 2.

Recreation Management
Impacts under Alternative 3 would be similar to those described for Alternative 2. The Zone 2 and 3 configuration under Alternative 3 would maintain a more natural or primitive corridor on the main touring road heading north towards the Agricultural Fields. Camping would not be allowed along the corridor unless in a designated spot. Negative impacts along the road would be reduced. And an overall high visual quality and sense of being in a more primitive area would be maintained.

Livestock Grazing
Impacts would generally be similar to those described for Alternatives 1 and 2. But under Alternative 3 adverse impacts to recreation settings could increase in drought years if stocking rates are not reduced. Impacts to the recreational settings could include bare soil in camping areas.

From Special Designations

Areas of Critical Environmental Concern
Impacts under Alternative 3 would be the same as under Alternative 2.

Impacts to Recreation from Alternative 4

From Desired Resource Conditions

Watershed, Fish and Wildlife, Cultural, and Visual Resources Management
Impacts under Alternative 4 would be the same as under Alternative 2.

From Land Use Allocations

Mineral Development
Impacts under Alternative 4 would be the same as under Alternative 2.

Utility Rights-of-Way and Land Use Authorizations
Impacts under Alternative 4 would be similar to those under Alternative 2. Not having a designated utility corridor next to the existing El Paso gas line would reduce the need for more service roads. The indirect impact might be the potential for the gas line road to be eliminated over time because new gas line technology might not require a service road. Therefore, a more primitive recreation setting could evolve. But visitors use the service road as access to the northern portion of the planning area. If the service road is ever closed, this access would be lost. The existing right-of-way in the planning area's northeast corner could be used for other types of rights-of-way. Impacts from this utility line already exist, and much of this line is not within the prime viewshed. But this line might not conform to Recreation Zone 3 prescriptions because it requires a service road that is used by the public. The road and its use therefore reduce the more primitive qualities of desired recreation settings.

Off-Highway Vehicle Management
Impacts of off-highway vehicle designation under Alternative 4 would be the same as under Alternative 2. The proposed road closures under Alternative 4 would affect some nonmotorized activities. No exclusively nonmotorized routes would be created, and all routes would be shared motorized-nonmotorized use, which is likely to increase user conflicts. Bicyclists and other mechanized vehicle users would have to remain on roads, whereas hikers and horseback riders would not. But no one would be allowed to use former roads designated for closure because they would be undergoing rehabilitation. Therefore, potential nonmotorized routes would be eliminated. Visitors might create new social trails in areas along old roadways.

Arizona Trail
Because the Arizona Trail would be shared use under Alternative 4, motorized-nonmotorized user conflicts would increase if the trail is designated on existing roads. The Arizona Trail planners might be forced to seek other routes outside public lands in the planning area because the shared use prescription would not meet the trail's goals. Placing the Arizona Trail trailhead at the Empire Ranch headquarters might conflict with Master Plan prescriptions. Overnight parking for the trail might also conflict with the desired settings and goals of the Master Plan.

Recreation Management
Impacts under Alternative 3 would generally be similar to those under the other alternatives. Under Alternative 4 desired recreation settings might be harder to maintain if visitor use increases dramatically. Most of the area would be prescribed for dispersed recreation use, and the least amount of area would be in the more restrictive Zones 1 and 2 (designated camp areas, group areas, and pullouts).

Livestock Grazing
Recreation use might increase if livestock grazing is removed from the public lands. Conflicts directly related to cattle grazing would decline, but conflicts with livestock could remain because equestrian recreation might increase. Corrals, water sources, and trails created by cattle might remain and be used by visitors. But maintenance costs of these developments would be transferred to BLM. Requests to hold large or numerous livestock-dependent events would increase. Recreational horseback riding impacts could replace grazing operation impacts on a smaller scale with higher impacts concentrated in popular areas. Increased opportunities for livestock-related and general special recreation permits would result.

From Special Designations

Areas of Critical Environmental Concern
Impacts under Alternative 4 would be the same as under Alternative 2.

SPECIAL DESIGNATION AREAS

Impacts to Wild and Scenic Rivers

Scope of Analysis: This section uses impacts to the resources and character of the wild and scenic river study area to compare the impacts of the alternatives on wild and scenic rivers.

Impacts to Wild and Scenic Rivers from Alternative 1 (Current Management)

Impacts of current management on the wild and scenic river study area and values were analyzed in the Arizona Statewide Wild and Scenic River Legislative Environmental Impact Statement (LEIS) (BLM 1994c).

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From Desired Resource Conditions

Watershed: Upland, Riparian, and Aquatic Vegetation Management

Existing watershed management would continue to protect the wild and scenic river study area and values. Actions that benefit the area have included stream restoration projects, prohibition of fuel wood cutting, and closure of hazardous roads or roads that disturb sensitive riparian areas.

Fish and Wildlife Management

Existing fish and wildlife management would continue to enhance Cienega Creek's wild and scenic river values as long as any creek restoration (1) uses rocks and materials that are neither visually disturbing nor chemically toxic and (2) assures rehabilitation or naturalizes impacts such as cut tree limbs, stumps, and heavy equipment tracks. Current signing methods should comply with Arizona statewide wild and scenic river guidelines.

Visual Resource Management

A Class III VRM designation could allow for some intrusions on the current scenic values of Cienega Creek.

Cultural Resource Management

Existing cultural resource management is consistent with protecting wild and scenic river values. Any impacts from data recovery projects in the wild and scenic river corridor could increase bank erosion, which would need to be mitigated. Data recovery projects (archeological digs) are rare and normally fit in visually and comply with outstandingly remarkable scenic values.

From Land Use Allocations

Mineral Development

Disturbance from any large-scale mining in the Empire Mountains could impair wild and scenic river values and would be mitigated through the required mining plans of operations. Mitigation for smaller mines should prevent degraded tributaries that could slightly affect Cienega Creek's wild and scenic river suitability.

Utility Rights-of-Way and Land Use Authorizations

Under current management BLM would discourage new transmission lines and natural gas lines within the wild and scenic river corridor. Rights-of-way in this corridor could degrade outstandingly remarkable values. Unauthorized motorized access on closed service roads could allow cumulative harm, including tree and vegetation degradation from unauthorized firewood collecting.

Off-Highway Vehicle Management

Continuing use of all existing roads might degrade portions of Cienega Creek where vehicle traffic is now being allowed in the wild and scenic river corridor. This area includes the Narrows and other portions of Cienega Creek used for motorized crossing. Impacts could include erosion, damage to stream banks, and discharged oil or other fluids from motor vehicles crossing or getting stuck in the creek.

The presence of many existing roads could slightly degrade wild and scenic river values. Too many easily accessible motorized points could encourage cumulative trampling and cutting of vegetation for firewood and cleared ground for dispersed campsites. Roads that dead-end within the wild and scenic river corridor contribute to destination camping spots being located too close to sensitive riparian resources.

Arizona Trail

Lack of designation of a route for the Arizona Trail would prevent attracting a cumulatively large target audience for the trail. But random social trails might develop for lack of a single marketed and designated trail.

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Recreation Management

Lack of recreation management zones would not affect the character of the wild and scenic river corridor or its outstandingly remarkable values.

Livestock Grazing

Restricting cattle from most of the wild and scenic river corridor under current management helps protect wild and scenic river values. To protect remarkable and outstanding features, BLM should continue to implement alternative nonintrusive livestock watering techniques out of the creek bed. In addition, BLM should design actions to maintain state water quality standards.

Use of livestock crossing lanes and watering areas impairs some wild and scenic river values. The public's negative perceptions of grazing in a wild and scenic river corridor could be moderate to high. Because Cienega Creek's flow is generally low, livestock manure in the creek from use of lanes and watering areas lowers water quality and might prevent the creek from meeting state water quality standards. Livestock trampling and foraging while using lanes and watering areas would also locally damage riparian areas.

From Special Designations

Areas of Critical Environmental Concern

Lack of an ACEC designation should not affect a stream's suitability as a wild and scenic because Alternative 1 (current management) already mandates management to protect wild and scenic river suitability. Where wild and scenic river mandates might overlap with ongoing actions, the more stringent actions would apply.

Impacts to Wild and Scenic Rivers from Alternative 2

From Desired Resource Conditions

Watershed: Upland, Riparian, and Aquatic Vegetation Management

The overall prescriptions for watershed, upland, and riparian areas would help Cienega Creek retain its suitability for wild and scenic river status. Some prescriptions such as burning or cutting trees could temporarily detract from scenic quality within the short term, depending on visitor perceptions, knowledge, and expectations. General wood cutting would not be allowed in the wild and scenic river study area. Administrative vegetation treatment that involves wood cutting and conforms to stricter VRM classifications by removing, camouflaging, or naturalizing cut stumps (stumps detract from scenic quality) would help maintain values.

Fish and Wildlife Management

Proposals would maintain wild and scenic river values as long as signing is integrated with the overall interpretive sign program and proposed developments conform to wild and scenic river prescriptions.

Visual Resource Management (VRM)

The more stringent VRM Class II designation under Alternatives 2, 3, and 4 would better maintain the values of the wild and scenic river study area than would Alternative 1.

Cultural Resource Management

Any significant archeological excavations within the corridor could harm the resources and character of the wild and scenic river study area if gullying or erosion is not mitigated. Overall, the cultural program is expected to enhance wild and scenic river values.

From Land Use Allocations

Mineral Development

The continued closure of most of the public lands and proposed mineral withdrawal would help maintain wild and scenic river values. The potential impacts projected for Alternative 1 would not occur under Alternative 2.

Utility Rights-of-Way and Land Use Authorizations
Designating utility corridors away from the wild and scenic river corridor would help maintain wild and scenic river values and be consistent with the recommended alternative from the Arizona Statewide Wild and Scenic Rivers LEIS (BLM 1994c). The proposed utility corridor in the northeast corner of the planning area would cross the Cienega Creek wild and scenic river corridor, and other lines within this corridor could degrade the scenic values of the wild and scenic river study area.

Off-Highway Vehicle Management
Restricting motor vehicles to designated roads would reduce the potential for perpetuating illegally created roads and would help maintain wild and scenic river values. The proposed road closures would help reduce unneeded roads in the wild and scenic river corridor and would eliminate almost all wet stream crossings.

Arizona Trail
The Arizona Trail route under Alternative 2 would be compatible with wild and scenic river values. But this nationally advertised trail could bring more people to the area than might otherwise come to the area under BLM's marketing strategy. Even though the Arizona Trail and BLM advocate Leave No Trace land use ethics, a low percentage of people actually follow strict Leave No Trace guidelines. Some portions of the wild and scenic river corridor would be degraded at the following places:

- Where hikers cross the creek.
- At day use rest spots.
- In camping areas.
- Where camp fires are built.

The cumulative impacts are human waste accumulation, lowered water quality, and extensive tree damage, which can occur over time where the trail crosses into the segments of the scenic corridor or in other areas suitable for camping. Trees and other woody plants could be gradually damaged. Impacts occur more often near streams because camping near a creek in Arizona has more attraction to many visitors than camping in sacaton grass flats or on rocky hillsides. Restrictions on camping in the riparian zone should minimize but would not eliminate these impacts.

Recreation Management
The recreation Zone 3 designation recommended for the wild and scenic river corridor under Alternative 2 would allow dispersed camping, but Alternatives 2, 3, and 4 would not allow camping within the riparian zone. Despite this restriction, wild and scenic river portions within Zone 3 might undergo cumulative harm from dispersed recreation use.

The lack of alternative potable water sources could have cumulative impacts to the creek where hikers and horseback riders trample vegetation to retrieve water. If there are no other potable water sources, Arizona Trail users would seek water from Cienega Creek, treating the water by boiling, filtering, or using chemicals.

Livestock Grazing
Impacts under Alternative 2 would generally be the same as under Alternative 1. In the activity plan proposal, any water developments where livestock waste could directly come into contact with wild and scenic river creek water should be avoided to maintain high standards for water quality. BLM should consider alternative livestock watering methods. Watering methods should not be obvious or detract from wild and scenic river values.

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From Special Designations

Areas of Critical Environmental Concern

The ACEC designation would add a layer of importance, perhaps pulling in more management dollars to the area and helping retain wild and scenic river values.

Impacts to Wild and Scenic Rivers from Alternative 3

From Desired Resource Conditions

Watershed, Fish and Wildlife, Cultural, and Visual Resource Management

Impacts under Alternative 3 would be the same as under Alternative 2.

From Land Use Allocations

Mineral Development

Impacts would be of the same type as under Alternative 1 but would have greater potential and scope under Alternative 3 because areas outside ACECs would be open to mineral development.

Utility Rights-of-Way and Land Use Authorizations

Impacts under Alternative 3 would be similar to those under Alternative 2.

Off-Highway Vehicle Management

Impacts under Alternative 3 would be the same as under Alternative 2.

Arizona Trail

Under Alternative 3 the Arizona Trail corridor would pass through the wild and scenic river corridor and might conflict with maintaining the wild and scenic river values in the Narrows portion of Cienega Creek.

Recreation Management

Impacts under Alternative 3 would be similar to those under Alternative 2, but under Alternative 3 some of the wild and scenic river corridor would fall in recreation Zone 2, which might better protect wild and scenic river values because it would restrict camping to designated areas. But because Alternatives 2, 3, and 4 would restrict camping within 100 feet of the stream, the increased protection in this small area would be minor.

Livestock Grazing

Impacts under Alternative 3 would be the same as under Alternative 1.

From Special Designations

Areas of Critical Environmental Concern

Impacts under Alternative 3 would be the same as under Alternative 2 because under both alternatives the wild and scenic river study area would be included within ACECs.

Impacts to Wild and Scenic Rivers from Alternative 4

From Desired Resource Conditions

Watershed, Fish and Wildlife, Cultural, and Visual Resource Management

Impacts under Alternative 4 would be the same as under Alternative 2.

From Land Use Allocations

Mineral Development

Impacts under Alternative 4 would be the same as under Alternative 2.

Utility Rights-of-Way and Land Use Authorizations

Impacts under Alternative 4 would be the same as under Alternatives 2 and 3.

Off-Highway Vehicle Management

Impacts under Alternative 4 would be the same as under Alternative 2.

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Arizona Trail
The Arizona Trail would not pass through the wild and scenic river corridor under Alternative 4 and would not affect wild and scenic river values.

Recreation Management
Impacts under Alternative 4 would be the same as under Alternative 2.

Livestock Grazing
Eliminating livestock grazing at the edge of or in the creek would benefit wild and scenic river values. But recreational livestock use might increase and have similar type of impacts.

From Special Designations

Areas of Critical Environmental Concern
Impacts under Alternative 4 would be the same as under Alternative 2.

Impacts to Areas of Critical Environmental Concern

Scope of Analysis: This section uses effects on ACEC resources to compare the impacts of the alternatives on ACECs.

Impacts to ACECs from all Alternatives

Impacts to Appleton-Whittell ACEC

See the discussion of impacts to watershed, upland and riparian vegetation, and fish and wildlife from all alternatives for the impacts to the resources of the ACEC.

Current management is protecting the resources and research use of this ACEC by implementing the proposed management for this ACEC prescribed in the Phoenix RMP (BLM 1987a, 1988) through the existing cooperative management agreement.

Alternatives 2, 3, and 4 would change the name of the ACEC to the Appleton-Whittell ACEC - Research Natural Area to better describe it and communicate its primary use. In addition, all roads on public lands would be restricted to administrative use. This restriction would ensure that unauthorized motor vehicle use does not interfere with ongoing research projects.

SOCIAL AND ECONOMIC CONCERNS

Impacts to Population and Demographics

Impacts to Population and Demographics from Alternative 1 (Current Management)

Alternative 1 (current management) would not change the population, demographics, and projections for Pima, Santa Cruz, and Cochise counties.

Impacts to Population and Demographics from Alternatives 2, 3, and 4

Establishing recreation zones and associated recreation management, including the designated recreation sites, would increase the number of visitors to the planning area but would not change the population and demographics of Pima, Santa Cruz, and Cochise counties.

Population and Demographics - Cumulative Impacts

Land tenure shifts influence population and demographics. As more land becomes available for private use and more people move into a rural setting seeking more open space, development would increase. If the surrounding State Trust or private lands are sold, the number of private dwellings surrounding the planning area might increase, but the population, demographics, and projections for Pima, Santa Cruz, and Cochise counties would not change.

Impacts to Local and Regional Economies

Impacts to Local and Regional Economies from Alternative 1 (Current Management)

Alternative 1 would not change the local and regional economy.

Impacts to Local and Regional Economies from Alternative 2

Increased recreation resulting from proposed recreation management under Alternative 2 might benefit the local and regional economy.

Impacts to Local and Regional Economies from Alternative 3

Impacts under Alternative 3 would be the same as under Alternative 2.

Impacts to Local and Regional Economies from Alternative 4

Increased recreation resulting from proposed recreation management might benefit the local and regional economy. But eliminating public land grazing under Alternative 4 would result in a loss of $129,000 in personal income to the local and regional economy. County revenue might slightly increase if intermixed or surrounding State Trust Lands become private.

Local and Regional Economies - Cumulative Impacts

The local and regional economies are slowly shifting from a rural and agriculture economy to a more commercial economy tied to recreation and tourism. The local and regional economies are also benefitting from increased recreational opportunities in the region and increased commerce in the Enterprise Zone.

Impacts to Employment

Impacts to Employment from Alternatives 1 (Current Management), 2, and 3

Alternatives 1, 2, and 3 would not change employment.

Impacts to Employment from Alternative 4

Eliminating livestock grazing on public lands would likely make ranching operations on two grazing allotments unfeasible and result in the loss of jobs on the two allotments.

Impacts to Environmental Justice

None of the alternatives would have disproportionate adverse human health or environmental effects on minority and low-income populations.

CUMULATIVE IMPACTS

Cumulative impacts include impacts from the incremental changes from all planned actions when added to other past, present, and reasonably foreseeable changes. Cumulative impacts can also result from individually minor but collectively significant actions taking place over time. When they would occur, cumulative impacts are described at the end of each impact section for each resource or program.

IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OF RESOURCES

An irretrievable commitment of a resource is one in which the resource or its use is lost for a period of time. An irreversible commitment of a resource is one that cannot be reversed; e.g. the extinction of a species.

The extraction of any locatable mineral ore would be an irretrievable commitment of resources.

Any disturbance to cultural or paleontological resources would be irreversible, and any loss of these resources would be irretrievable.

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UNAVOIDABLE ADVERSE IMPACTS

Unavoidable adverse impacts are impacts that remain following the implementation of mitigation measures, or impacts for which there are no mitigation measures. Some unavoidable adverse impacts will occur as a result of proposed management under one or more of the altematives. Others are a result of public use of BLM-managed lands within the planning area.

Development of mineral resources could create visual intrusions, soil erosion, and compaction problems, and loss of vegetation cover.

Unauthorized off-road vehicle travel could cause scarring, increased soil erosion, and loss of vegetation cover.

Development of designated recreation sites and trails and development of livestock waters could cause soil compaction, increased soil erosion, and loss of vegetation cover.

Accidental or unauthorized introduction of exotic plant or animal species could result in harm or loss of populations of native plants or animals.

Proposed restrictions on recreation, livestock operations, and other land use authorizations to protect sensitive resources and other values would lessen the ability of operators, permittees, individuals, and groups to use the public lands and could increase operating costs.

Virtually all potential unavoidable adverse impacts are indirect, long-term, and difficult to quantify.

CHAPTER 5

CONSULTATION AND COORDINATION

A meeting of the Sonoita Valley Planning Partnership.

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CHAPTER 5
CONSULTATION AND COORDINATION

INTRODUCTION

BLM's work on the Empire-Cienega Integrated Management Plan–an amendment to the Phoenix Resource Management Plan (RMP)–involved two major phases. During the first phase BLM officially began work on the plan amendment on March 24,1989, with a *Federal Register* Notice of Intent to prepare a plan amendment/ environmental impact statement. A 30-day scoping comment period followed scoping meetings on April 11 and 12, 1989, in Sonoita and Tucson, Arizona. BLM received 98 responses, including 60 comment letters and 38 letters requesting more information as it became available. BLM then formulated the planning issues and criteria and on July 20, 1990, mailed an RMP amendment update to the public. Enclosed were the issues and planning criteria. The comment period on the criteria and issues ended on August 20, 1990.

BLM suspended the planning effort in December 1991 when it administratively transferred the lands under consideration from its Phoenix District to its Safford District. Due to the change in administration of the Empire-Cienega lands, BLM's Safford District restructured the planning effort to the Safford RMP and held the following public meetings:

- December 15, 1992, in Eloy, Arizona.
- December 16, 1992, in Elgin, Arizona.
- December 17, 1992, in Tucson, Arizona.

At these meetings the BLM's interdisciplinary planning team presented details on the three alternatives that it had drafted for the Empire-Cienega Planning Area.

BLM again put the plan amendment on hold while it undertook several large projects, including the Arizona Wild and Scenic Rivers EIS in 1993-1994. BLM also worked on other agency reorganizations, which resulted in more organizational changes for the BLM's Tucson Office. During this time BLM as an agency was changing and was placing new emphasis on ecosystem approaches to planning and management.

In 1995, BLM began the second phase of work on the Empire-Cienega plan amendment. Because it was managing lands administered by the new Tucson Field Office but managed under both the Phoenix and Safford RMPs, BLM decided to return to the approach of amending the Phoenix RMP in completing an RMP amendment for the Empire-Cienega Planning Area. These lands were within the old Phoenix Planning Unit, and an appendix to the Phoenix RMP included interim management guidance for the Empire-Cienega Planning Area.

BLM's Tucson Field Office decided to take a new, collaborative approach to the plan amendment. This approach led to the forming of the Sonoita Valley Planning Partnership (SVPP). SVPP is an informal, voluntary association of public and private participants (federal, state, and local agencies, organized groups, and individuals) who share a common interest in the future of public land resources in the Sonoita Valley. The mailing list for the earlier work on the plan amendment became a source for generating invitations to participate in the community potluck and workshop that led to the creation of this partnership.

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PUBLIC INVOLVEMENT AND CONSULTATION

PUBLIC MEETINGS/OPEN HOUSES

BLM conducted scoping during Phase 1 of the Empire-Cienega Plan Amendment through a series of public open houses:

April 11, 1989 - Sonoita
April 12, 1989 - Tucson

BLM conducted more scoping in Phase 2 of the planning effort during the community potluck, community workshop, and the first meetings of the working groups of the Sonoita Valley Planning Partnership as detailed in the following chronology.

Sonoita Valley Planning Partnership Chronology

In January 1995, BLM brought together people from federal, state, and local agencies with an interest in the Sonoita area to discuss forming a partnership to work with the community on public land issues. All participants had a strong interest in the valley. This meeting was followed by a community potluck in April 1995. Agencies and groups were then invited to put up displays of their activities in the Sonoita area. Participants toured sites in the valley and filled out questionnaires on their concerns for the valley's future.

In July 1995, the Sonoita Valley Planning Partnership held a community workshop to review the questionnaire results and discuss other Sonoita Valley issues. Workshop participants decided to have the partnership deal only with issues involving public lands surrounding the Sonoita Valley and to defer issues of growth management and private land concerns to another effort. They formed three working groups to confront issues relating to (1) wildlife-vegetation, (2) water-minerals, and (3) people.

The working groups met monthly from August to December 1995. During this time the working groups developed desired future condition descriptions: visions, goals, and objectives for upland vegetation, riparian vegetation, aquatic habitats, fish and wildlife, cultural resources, and recreation opportunities.

In December 1995, the working groups gave a joint presentation on their visions, goals, objectives, and categorization of issues. Group members also decided to merge the water-minerals and wildlife-vegetation groups into a natural resources working group and to continue to meet monthly. The Sonoita Valley Planning Partnership defined its area of concern as roughly the Cienega Creek watershed south of Interstate 10 and small portions of the upper watersheds of Sonoita Creek and the Babocomari River.

From January to September 1996, the working groups met monthly. They refined resource objectives. They participated in technical presentations on fire management, wildlife management, grasslands, riparian vegetation and cultural resources. They worked on the preliminary development of management strategies.

In September 1996, the groups gave another joint presentation on achievements in objectives and management strategies and decided to have all working groups meet together to finalize their objectives and develop alternative management strategies. From November 1996 to May 1997, the Partnership in monthly meetings refined and agreed on the wording of their resource objectives, which they wrote so that managers or owners could apply them to any lands within the Partnership's focus area in the upper Cienega Creek basin.

From June 1997 to October 1998, the Partnership's monthly meetings focused on developing and refining alternative management strategies to resolve issues and meet the resource objectives, mainly on the public lands within the planning area. In addition, several new subgroups were formed to work on the details of proposals and report back to the Partnership at regular monthly meetings.

From December 1998 to February 1999, the Partnership worked on achieving consensus on a preferred series of management strategies out of the alternative strategies it had developed.

From March 1999 to February 2000, the Partnership met four times (February, May, and September 1999 and February 2000) to develop a monitoring program for the Empire-Cienega Planning Area.

Dates of SVPP meetings

Community Potluck
April 22, 1995

Community Workshop
July 22, 1995

Wildlife/Vegetation Working Group and Water/Minerals Working Group Meetings
August 19, 1995
September 16, 1995
October 14, 1995
November 11, 1995 (Wildlife/Vegetation)
November 18, 1995 (Water/Minerals)
December 9, 1995 (Joint Meeting of all three working groups)
January 6, 1996 (Wildlife and Vegetation and Water and Minerals working groups now combined)
February 10, 1996
March 9, 1996
April 13, 1996
June 8, 1996
July 20, 1996
August 10, 1996
September 14, 1996 (joint meeting of two working groups)

People Working Group Meetings
August 26, 1995
September 23, 1995
October 22, 1995
November 18, 1995
December 9, 1995 (joint meeting of three working groups)
January 13, 1996
February 10, 1996
March 9, 1996
April 13, 1996
June 8, 1996
July 20, 1996
August 10, 1996
September 14, 1996 (joint meeting of two working groups)

Planning Partnership Monthly Meetings
November 9, 1996
January 11, 1997
February 8, 1997
March 8, 1997
April 12, 1997
May 10, 1997
June 14, 1997
July 12, 1997
August 9, 1997
September 13, 1997
October 11, 1997
November 8, 1997
January 10, 1998
February 14, 1998
March 14, 1998
April 11, 1998
May 30, 1998
June 13, 1998
July 11, 1998
August 8, 1998
September 19, 1998
October 17, 1998

December 12, 1998
January 9, 1999
January 26, 1999
February 12, 1999
February 19, 1999
August 1999

Recreation Subgroup
December 3, 1997
January 10, 1998
February 14, 1998
March 26, 1998
May 9, 1998
June 27, 1998
July 7, 1998
July 23, 1998
August 25, 1998

Monitoring Subgroup
February 26, 1999
May 6, 1999
September 17, 1999
February 10, 2000 (technical workshop)

Coordination with State and Federal Agencies

BLM coordinated with the federal and state agencies listed in Table 5-1 while developing the draft plan.

Throughout the planning and EIS process, BLM will continue to coordinate and consult with the State Historic Preservation Office (SHPO) on identifying and treating cultural resources and with the U.S. Fish and Wildlife Service on potential impacts to threatened and endangered species.

Coordination with Tribal Governments

While developing the draft plan BLM coordinated with the tribal governments or members of the communities, tribes, and nations listed in Table 5-2.

PUBLIC OUTREACH

Public outreach included presentations by members of the planning team to Region 5 of the Arizona Game and Fish Department, Arizona Game and Fish Commission, Arizona State Land Department, BLM Resource Advisory Council, Arizona Department of Water Resources, Arizona Game and Fish Commission's Heritage Public Advisory Committee, Empire Ranch Foundation, Green Valley High 12 Club, Society of Environmental Journalists, Sonoita Crossroads Community Forum, Natural Areas Association Conference, Alternative Dispute Resolution Conference, Conference on Research and Management in the Southwest. BLM also led several tours for Arizona Senate and congressional representatives.

Table 5-1. State and Federal Agencies Contacted for the Empire-Cienega Integrated Management Plan

State Agencies	**Federal Agencies**
Arizona Department of Environmental Quality	U.S. Department of Defense, Ft. Huachuca
Arizona Department of Water Resources	*USDA Forest Service, Coronado National Forest
*Arizona Game and Fish Department	*U.S. Geological Survey
Arizona State Historic Preservation Office	*USDA Natural Resource Conservation Service
*Arizona State Land Department	*USDI Fish and Wildlife Service
*Arizona State Parks Department	USDI National Park Service, Coronado National Memorial

*Agencies whose representatives were active participants in the Sonoita Valley Planning Partnership.

Table 5-2. Tribal Governments Contacted for the Empire-Cienega Integrated Management Plan

Ak-Chin Indian Community	Salt River Pima-Maricopa Community
Gila River Indian Community	San Carlos Apache Tribe
Members of Hopi Tribe	Tohono O'Odham Nation
Mohave-Apache Tribal Council	Yavapai-Apache Tribe
Pascua Yaqui Council	White Mountain Apache Tribe

LIST OF PREPARERS

Tucson Field Office

Bill Auby, Geologist
B.S., geology/geophysics, University of Wisconsin, Madison. M.S., Geology, Northern Illinois University. Bill has worked for 8 years with the BLM. He prepared the geology, mineral development, and hazardous materials portions of the draft plan.

Susan Bernal, Realty Specialist
B.S., regional development, University of Arizona. Susan has worked for the BLM for 4 years. She prepared the lands sections of the draft plan, including utility rights-of-way and land use permits.

Vic Brown, District Ranger
B.A, geography and geology. Vic has 22 years of federal service with National Park Service as a park ranger and with BLM as a district ranger. He provided input on resource, recreation, law enforcement, and regulations for the draft plan.

Grant Drennen, Range Specialist
B.S., range science/watershed, Utah State University. Grant has 22 years of service with the BLM. He prepared the upland vegetation, fire, and livestock grazing sections of the draft plan.

Catie Fenn, Outdoor Recreation Planner
A.A., natural sciences, Pima Community College; B.S., resource management, Northern Arizona University. Catie has 9 years of experience with BLM , 9 years with the National Park Service, and 4 years with the Forest Service. She prepared the outdoor recreation, visual resources, and wild and scenic rivers portions of the draft plan.

Mark Fredlake, Wildlife Biologist
B.S., wildlife biology, Arizona State University, 1977. Mark has worked for BLM for nearly 23 years. He prepared the wildlife portions of the draft plan.

Karen Simms, Ecosystem Planning Team Leader
B.S., zoology, University of California, Davis; M.S., wildlife biology, University of Arizona. Karen has 11 years of experience with BLM. She served as team leader for the BLM interdisciplinary team that prepared the draft document and was the community facilitator for the Sonoita Valley Planning Partnership, which worked with BLM on developing goals and objectives for the Sonoita Valley and in developing management proposals and generating alternatives for consideration.

Max Witkind, Archaeologist
B.A., technical journalism and M..S., anthropology, Colorado State University. Max has worked for the BLM for 16 years in Colorado and Arizona and for 5 years with the Army Corps of Engineers in Arkansas. Before his government service he taught cultural and physical anthropology at San Antonio College in Texas (1971-1979). He prepared the cultural and paleontological resources sections of the draft document.

Arizona State Office

Jeff Simms, Fishery Biologist
B.S., fishery science, University of Arizona; M.S., fishery and wildlife science, University of Arizona. Jeff has worked for the BLM for 9 years in the Safford and Tucson field offices and is now assigned to the Arizona State Office. He prepared the watershed, riparian, and fisheries sections of the draft document.

Jim Renthal, Natural Resources Specialist
B.A., psychology, University of Chicago; M.S., watershed management, University of Arizona. Jim has worked for the BLM for 23 years in Arizona, Idaho, and Oregon. He prepared the air quality, water quality, and portions of the watershed sections of the draft document.

Gina Ramos, Natural Resource Specialist
B.S., range science, New Mexico State University, M.B.A., University of Phoenix. Gina has 19 years of service with the BLM. She prepared the socioeconomic, environmental justice, and noxious weeds section of the draft plan.

National Training Center

Ken McGinty, Writer-Editor
B.A., history, Duke University; M.A, geography, Clark University. A BLM writer-editor for 25 years, Ken edited the draft document.

Tucson Field Office Support

Mary Farber, Biological Technician
A.A., general studies, Pima Community College, and currently obtaining a B.S. degree in wildlife and fisheries science from the University of Arizona. Mary has worked with the BLM for 1½ years, helping prepare for public meetings, preparing meeting minutes, conducting mailings, and performing other support tasks.

Francisco Mendoza, Outdoor Recreation Planner
B.S., landscape architecture, University of Arizona. Francisco has 19 years of service with BLM. He helped with the input and analysis of GIS data and the preparation of GIS maps for the draft plan.

PARTICIPANTS[1] IN THE SONOITA VALLEY PLANNING PARTNERSHIP

Federal, State, and Local Agencies

Bureau of Land Management, Tucson Field Office and Arizona State Office
Coronado National Forest, Nogales and Sierra Vista Ranger Districts
Natural Resource Conservation Service, Tucson Office
U.S. Fish and Wildlife Service, Arizona Ecological Services Offices
U.S. Geological Survey, Tucson Office
Arizona Game and Fish Department
Arizona State Land Department
Arizona State Parks
Pima County Flood Control, Parks and Recreation, and Planning and Zoning
Santa Cruz County Planning and Zoning

Organizations, Institutions, Businesses

(Generated from affiliations expressed by individual participants[1]. These individuals may or may not have been officially representing the organization, institution, or business).

AEPCO
Appleton-Whittell Research Ranch
Arizona State Association of 4WD Clubs
Arizona State University, Dept. of Plant Biology
Arizona Trail Association
ASARCO
County Line Riders of Catalina
El Paso Natural Gas
Empire Ranch
Empirita Ranch
Empire Ranch Foundation
Friends of Pronatura
High Haven Ranch
Huachuca Hiking Club
Phoenix Zoo
Pima NRCD
Rose Tree Ranch
Sierra Club, Rincon Group
Sky Island Alliance
Sonoita Bird Dog Club
Sonoita Crossroads Community Forum
Sonoita -Elgin Emergency Services
Sonoran Institute
Southern Arizona German Shorthair Pointer Club
Southern Arizona Mountain Bike Association
The Nature Conservancy
Tucson Saddle Club
Vera Earl Ranch
University of Arizona, Cooperative Extension
University of Arizona, School of Renewable Natural Resources

Individuals

Individual participants[1] came from the following Arizona communities: Benson, Elgin, Green Valley, Huachuca City, Mesa, Nogales, Phoenix, Sierra Vista, Sonoita, Tempe, Tucson, and Vail.

Mailing list

In addition to the above participants, persons and organizations from the following communities are on or represented on the Sonoita Valley Planning Partnership mailing list.

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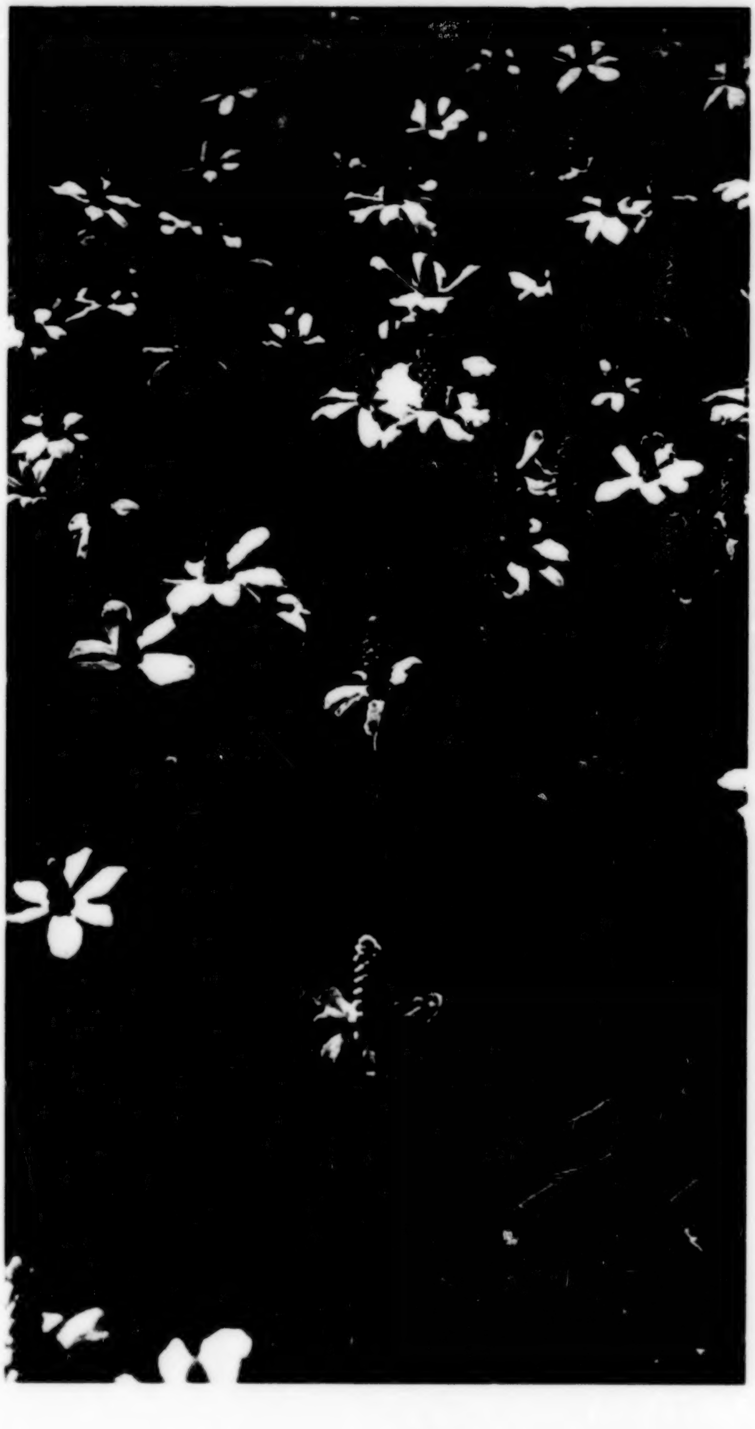
[1] Participants are defined as having attended at least one meeting or contacted the Planning Partnership at least once via mail or e-mail.

ARIZONA: Amado, Apache Junction, Bisbee, Camp Verde, Claypool, Hereford, Ft. Huachuca, Gilbert, Glendale, Kingman, Lakeside, Morenci, Parker, Patagonia, Peach Springs, Safford, Sahuarita, San Carlos, Scottsdale, Sells, Wilcox.

OTHER: San Bernadino, CA; Bishop, CA; Washington, DC; Rockville, MD; Picayune, MS; Santa Fe, NM; Isopus, NY.

APPENDICES



APPENDIX 1

The Act Establishing the Las Cienegas National Conservation Area

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One Hundred Sixth Congress
of the
United States of America
AT THE SECOND SESSION
Begun and held at the City of Washington on Monday, the twenty-fourth day of January, two thousand
An Act
To establish the Las Cienegas National Conservation Area in the State of Arizona.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. DEFINITIONS

For the purposes of this Act, the following definitions apply:

(1) CONSERVATION AREA - The term `Conservation Area' means the Las Cienegas National Conservation Area established by section 4(a).

(2) ACQUISITION PLANNING DISTRICT - The term 'Acquisition Planning District' means the Sonoita Valley Acquisition Planning District established by section 2(a).

(3) MANAGEMENT PLAN - The term `management plan' means the management plan for the Conservation Area.

(4) PUBLIC LANDS - The term `public lands' has the meaning given the term in section 103(e) of the Federal Land Policy and Management Act of 1976 (43 U.S.C. 1702(e)), except that such term shall not include interest in lands not owned by the United States.

(5) SECRETARY - The term `Secretary' means the Secretary of the Interior.

SECTION 2. ESTABLISHMENT OF THE SONOITA VALLEY ACQUISITION PLANNING DISTRICT

(a) IN GENERAL - In order to provide for future acquisitions of important conservation land within the Sonoita Valley region of the Stae of Arizona, there is hereby established the Sonoita Valley Acquisition Planning District.

(b) AREAS INCLUDED - The Acquisition Planning District shall consist of approximately 142,800 acres of land in the Arizona counties of Pima and Santa Cruz, including the Conservation Area, as generally depicted on the map entitled `Sonoita Valley Acquisition Planning District and Las Cienegas National Conservation Area' and dated October 2, 2000.

(c) MAP AND LEGAL DESCRIPTION - As soon as practicable after the date of the enactment of this Act, the Secretary shall submit to Congress a map and legal description of the Acquisition Planning District. In case of a conflict between the map referred to in subsection (b) and the map and legal description submitted by the Secretary, the map referred to in subsection (b) shall control. The map and legal description shall have the same force and effect as if included in this Act, except that the Secretary may correct clerical and typographical errors in such map and legal description. Copies of the map and legal description shall be on file and available for public inspection in the Office of the Director of the Bureau of Land Management, and in the appropriate office of the Bureau of Land Management in Arizona.

SECTION 3. PURPOSES OF THE ACQUISITION PLANNING DISTRICT

(a) IN GENERAL - The Secretary shall negotiate with land owners for the acquisition of lands and interest in lands suitable for Conservation Area expansion that meet the purposes described in section 4(a). The Secretary shall only acquire property under this Act pursuant to section 7.

(b) FEDERAL LANDS - The Secretary, through the Bureau of Land Management, shall administer the public lands within the Acquisition Planning District pursuant to this Act and the applicable provisions of the Federal Land Policy and Management Act of 1976 (43 U.S.C. 1701 et seq.), subject to valid existing rights, and in accordance with the management plan. Such public lands shall become part of the Conservation Area when they become contiguous with the Conservation Area.

(c) FISH AND WILDLIFE - Nothing in this Act shall be construed as affecting the jurisdiction or responsibilities of the State of Arizona with respect to fish and wildlife within the Acquisition Planning District.

(d) PROTECTION OF STATE AND PRIVATE LANDS AND INTERESTS - Nothing in this Act shall be construed as affecting any property rights or management authority with regard to any lands or interest in lands held by the State of Arizona, any political subdivision of the State of Arizona, or any private property rights within the boundaries of the Acquisition Planning District.

(e) PUBLIC LANDS - Nothing in this Act shall be construed as in any way diminishing the Secretary's or the Bureau of Land Management's authorities, rights, or responsibilities for managing the public lands within the Acquisition Planning District.

(f) COORDINATED MANAGEMENT - The Secretary shall coordinate the management of the public lands within the Acquisition Planning District with that of surrounding county, State, and private lands consistent with the provisions of subsection (d).

SECTION 4. ESTABLISHMENT OF THE LAS CIENEGAS NATIONAL CONSERVATION AREA

(a) IN GENERAL - In order to conserve, protect, and enhance for the benefit and enjoyment of present and future generations the unique and nationally important aquatic, wildlife, vegetative, archaeological, paleontological, scientific, cave, cultural, historical, recreational, educational, scenic, rangeland, and riparian resources and values of the public lands described in subsection (b) while allowing livestock grazing and recreation to continue in appropriate areas, there is hereby established the Las Cienegas National Conservation Area in the State of Arizona.

(b) AREAS INCLUDED - The Conservation Area shall consist of approximately 42,000 acres of public lands in the Arizona counties of Pima and Santa Cruz, as generally depicted on the map entitled `Sonoita Valley Acquisition Planning District and Las Cienegas National Conservation Area' and dated October 2, 2000.

(c) MAPS AND LEGAL DESCRIPTION - As soon as practicable after the date of the enactment of this Act, the Secretary shall submit to Congress a map and legal description of the Conservation Area. In case of a conflict between the map referred to in subsection (b) and the map and legal description submitted by the Secretary, the map referred to in subsection (b) shall control. The map and legal description shall have the same force and effect as if included in this Act, except that the Secretary may correct clerical and typographical errors in such map and legal description. Copies of the map and legal description shall be on file and available for public inspection in the Office of the Director of the Bureau of Land Management, and in the appropriate office of the Bureau of Land Management in Arizona.

(d) FOREST LANDS - Any lands included in the Coronado National Forest that are located within the boundaries of the Conservation Area shall be considered to be a part of the Conservation Area. The Secretary of Agriculture shall revise the boundaries of the Coronado National Forest to reflect the exclusion of such lands from the Coronado National Forest.

SECTION 5. MANAGEMENT OF THE LAS CIENEGAS NATIONAL CONSERVATION AREA

(a) IN GENERAL - The Secretary shall manage the Conservation Area in a manner that conserves, protects, and enhances its resources and values, including the resources and values specified in section 4(a), pursuant to the Federal Land Policy and Management Act of 1976 (43 U.S.C. 1701 et seq.) and other applicable law, including this Act.

(b) USES - The Secretary shall allow only such uses of the Conservation Area as the Secretary finds will further the purposes for which the Conservation Area is established as set forth in section 4(a).

(c) GRAZING - The Secretary of the Interior shall permit grazing subject to all applicable laws, regulations, and Executive orders consistent with the purposes of this Act.

(d) MOTORIZED VEHICLES - Except where needed for administrative purposes or to respond to an emergency, use of motorized vehicles on public lands in the Conservation Area shall be allowed only--(1)

before the effective date of a management plan prepared pursuant to section 6, on roads and trails designated for use of motorized vehicles in the management plan that applies on the date of the enactment of this Act; and (2) after the effective date of a management plan prepared pursuant to section 6, on roads and trails designated for use of motor vehicles in that management plan.

(e) MILITARY AIRSPACE - Prior to the date of the enactment of this Act the Federal Aviation Administration approved restricted military airspace (Areas 2303A and 2303B) which covers portions of the Conservation Area. Designation of the Conservation Area shall not impact or impose any altitude, flight, or other airspace restrictions on current or future military operations or missions. Should the military require additional or modified airspace in the future, the Congress does not intend for the designation of the Conservation Area to impede the military from petitioning the Federal Aviation Administration to change or expand existing restricted military airspace.

(f) ACCESS TO STATE AND PRIVATE LANDS - Nothing in this Act shall affect valid existing rights-of-way within the Conservation Area. The Secretary shall provide reasonable access to nonfederally owned lands or interest in lands within the boundaries of the Conservation Area.

(g) HUNTING - Hunting shall be allowed within the Conservation Area in accordance with applicable laws and regulations of the United States and the State of Arizona, except that the Secretary, after consultation with the Arizona State wildlife management agency, may issue regulations designating zones where and establishing periods when no hunting shall be permitted for reasons of public safety, administration, or public use and enjoyment.

(h) PREVENTATIVE MEASURES - Nothing in this Act shall preclude such measures as the Secretary determines necessary to prevent devastating fire or infestation of insects or disease within the Conservation Area.

(i) NO BUFFER ZONES - The establishment of the Conservation Area shall not lead to the creation of protective perimeters or buffer zones around the Conservation Area. The fact that there may be activities or uses on lands outside the Conservation Area that would not be permitted in the Conservation Area shall not preclude such activities or uses on such lands up to the boundary of the Conservation Area consistent with other applicable laws.

(j) WITHDRAWALS - Subject to valid existing rights all Federal lands within the Conservation Area and all lands and interest therein which are hereafter acquired by the United States are hereby withdrawn from all forms of entry, appropriation, or disposal under the public land laws and from location, entry, and patent under the mining laws, and from operation of the mineral leasing and geothermal leasing laws and all amendments thereto.

SECTION 6. MANAGEMENT PLAN

(a) PLAN REQUIRED - Not later than 2 years after the date of the enactment of this Act, the Secretary, through the Bureau of Land Management, shall develop and begin to implement a comprehensive management plan for the long-term management of the public lands within the Conservation Area in order to fulfill the purposes for which it is established, as set forth in section 4(a). Consistent with the provisions of this Act, the management plan shall be developed--(1) in consultation with appropriate departments of the State of Arizona, including wildlife and land management agencies, with full public participation; (2) from

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the draft Empire-Cienega Ecosystem Management Plan/EIS, dated October 2000, as it applies to Federal lands or lands with conservation easements; and (3) in accordance with the resource goals and objectives developed through the Sonoita Valley Planning Partnership process as incorporated in the draft Empire-Cienega Ecosystem Management Plan/EIS, dated October 2000, giving full consideration to the management alternative preferred by the Sonoita Valley Planning Partnership, as it applies to Federal lands or lands with conservation easements.

(b) CONTENTS - The management plan shall include--(1) provisions designed to ensure the protection of the resources and values described in section 4(a); (2) an implementation plan for a continuing program of interpretation and public education about the resources and values of the Conservation Area; (3) a proposal for minimal administrative and public facilities to be developed or improved at a level compatible with achieving the resource objectives for the Conservation Area and with the other proposed management activities to accommodate visitors to the Conservation Area; (4) cultural resources management strategies for the Conservation Area, prepared in consultation with appropriate departments of the State of Arizona, with emphasis on the preservation of the resources of the Conservation Area and the interpretive, educational, and long-term scientific uses of these resources, giving priority to the enforcement of the Archaeological Resources Protection Act of 1979 (16 U.S.C. 470aa et seq.) and the National Historic Preservation Act (16 U.S.C. 470 et seq.) within the Conservation Area; (5) wildlife management strategies for the Conservation Area, prepared in consultation with appropriate departments of the State of Arizona and using previous studies of the Conservation Area; (6) production livestock grazing management strategies, prepared in consultation with appropriate departments of the State of Arizona; (7) provisions designed to ensure the protection of environmentally sustainable livestock use on appropriate lands within the Conservation Area; (8) recreation management strategies, including motorized and nonmotorized dispersed recreation opportunities for the Conservation Area, prepared in consultation with appropriate departments of the State of Arizona; (9) cave resources management strategies prepared in compliance with the goals and objectives of the Federal Cave Resources Protection Act of 1988 (16 U.S.C. 4301 et seq.); and (10) provisions designed to ensure that if a road or trail located on public lands within the Conservation Area, or any portion of such a road or trail, is removed, consideration shall be given to providing similar alternative access to the portion of the Conservation Area serviced by such removed road or trail.

(c) COOPERATIVE AGREEMENTS - In order to better implement the management plan, the Secretary may enter into cooperative agreements with appropriate Federal, State, and local agencies pursuant to section 307(b) of the Federal Land Policy and Management Act of 1976 (43 U.S.C. 1737(b)).

(d) RESEARCH ACTIVITIES - In order to assist in the development and implementation of the management plan, the Secretary may authorize appropriate research, including research concerning the environmental, biological, hydrological, cultural, agricultural, recreational, and other characteristics, resources, and values of the Conservation Area, pursuant to section 307(a) of the Federal Land Policy and Management Act of 1976 (43 U.S.C. 1737(a)).

SECTION 7. LAND ACQUISITION

(a) IN GENERAL-(1) PRIORITY TO CONSERVATION EASEMENTS - In acquiring lands or interest in lands under this section, the Secretary shall give priority to such acquisitions in the form of conservation easements. (2) PRIVATE LANDS- The Secretary is authorized to acquire privately held lands or interest in lands within the boundaries of the Acquisition Planning District only from a willing seller through donation, exchange, or purchase. (3) COUNTY LANDS- The Secretary is authorized to acquire county lands or interest in lands within the boundaries of the Acquisition Planning District only with the consent of the county through donation, exchange, or purchase. (4) STATE LANDS-(A) IN GENERAL- The Secretary is authorized to acquire lands or interest in lands owned by the State of Arizona located within the boundaries of the Acquisition Planning District only with the consent of the State and in accordance with State law, by donation, exchange, or purchase. (B) CONSIDERATION- As consideration for the acquisitions by the United States of lands or interest in lands under this paragraph, the Secretary shall pay fair market value for such lands or shall convey to the State of Arizona all or some interest in Federal lands (including buildings and other improvements on such lands or other Federal property other than real property) or any other asset of equal value within the State of Arizona. (C) TRANSFER OF JURISDICTION- All Federal agencies are authorized to transfer jurisdiction of Federal lands or interest in lands (including buildings and other improvements on such lands or other Federal property other than real property) or any other asset within the State of Arizona to the Bureau of Land Management for the purpose of acquiring lands or interest in lands as provided for in this paragraph.

(b) MANAGEMENT OF ACQUIRED LANDS - Lands acquired under this section shall, upon acquisition, become part of the Conservation Area and shall be administered as part of the Conservation Area. These lands shall be managed in accordance with this Act, other applicable laws, and the management plan.

SECTION 8. REPORTS TO CONGRESS

(a) PROTECTION OF CERTAIN LANDS - Not later than 2 years after the date of the enactment of this Act, the Secretary shall submit to Congress a report describing the most effective measures to protect the lands north of the Acquisition Planning District within the Rincon Valley, Colossal Cave area, and Agua Verde Creek corridor north of Interstate 10 to provide an ecological link to Saguaro National Park and the Rincon Mountains and contribute to local government conservation priorities.

(b) IMPLEMENTATION OF THIS ACT - Not later than 5 years after the date of the enactment of this Act, and at least at the end of every 10-year period thereafter, the Secretary shall submit to Congress a report describing the implementation of this Act, the condition of the resources and values of the Conservation Area, and the progress of the Secretary in achieving the purposes for which the Conservation Area is established as set forth in section 4(a).

Speaker of the House of Representatives. Vice President of the United States and President of the Senate.
Reference: Public Law 106-538 (December 6, 2000)

APPENDIX 2

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1. DESCRIPTION OF MANAGEMENT GUIDANCE COMMON TO ALL ALTERNATIVES

The following management guidance common to all alternatives summarizes the policies, regulations, and laws that guide and affect the management of public lands and resources for each resource program.

WATERSHED MANAGEMENT

The Federal Land and Policy Act of 1967 (FLPMA) defines BLM's multiple use management mission to include protection of watersheds. FLPMA requires that public lands be managed to protect scientific, environmental, air and atmospheric, and water resources. FLPMA also requires (1) that BLM develop land use plans to guide the management actions on these lands and (2) that land use plans comply with state and federal air, water, and pollution standards.

FLPMA requires compliance with the following laws:

1. Soil Conservation and Domestic Allotment Act of 1935.
2. Watershed Protection and Flood Control Act of 1954.
3. Colorado River Basin Salinity Control Act of 1974.
4. Wild and Scenic Rivers Act of 1968.
5. National Environmental Policy Act of 1969.
6. Federal Pollution Control Act with amendments of 1972.
7. Clean Water Act of 1989.
8. Safe Drinking Water Act of 1977.

The Clean Air Act of 1970 and the 1990 amendments govern air quality. BLM Manual 7000 and executive orders provide field guidance in managing soil, water, and air.

SOILS MANAGEMENT

The common goal of all the alternatives in this resource management plan is to minimize soil erosion and rehabilitate eroded areas to maintain and enhance watershed condition and reduce nonpoint source pollution that could result from rangeland management use and activities.

BLM's current grazing regulations (43CFR part 4000) provide Standards and Guidelines for Rangeland Health. BLM has supplemented regulations to be more responsive to land management in Arizona. These regulations apply to all BLM-administered lands where livestock grazing is permitted. The standards provide objectives that must be achieved for BLM-managed soil, water, and vegetation resources. BLM evaluates activities proposed in erosion-prone areas through the National Environmental Policy Act process to determine expected impacts and mitigating measures needed to abate possible impacts.

WATER MANAGEMENT

BLM's mandate of the water resource program consists of the following:

- To ensure the physical presence and legal availability of water on public lands.
- To ensure that those waters meet or exceed federal and state water quality standards for specific uses.
- To mitigate activities to prevent water quality degradation.

The water resource program is divided into three parts: (1) water inventory (2) water rights, and (3) monitoring.

Water Inventory: BLM policy is to inventory all water resources on public lands it administers and to document and store this data in its Water Data Management System.

Water Rights: BLM policy is to file for water rights on all water sources on public and acquired lands in accordance with State of Arizona water laws.

Water Quality: BLM monitors water quality to assess resource impacts from specific activities and to obtain baseline resource information.

Nonpoint source pollution abatement authority is addressed in Section 319 of the Federal Clean Water Act Amendments of 1987 and the State of Arizona Environmental Quality Act (EQA) of 1986. The Arizona Department of Environmental Quality (ADEQ) is the state agency responsible for nonpoint source water pollution control and abatement. ADEQ annually reports on the status of the water quality and any impaired waters. For more information see the ADEQ - Arizona Water Quality Assessment: 1998 - 305b Report & Arizona Provisional Water Quality Limited Waters List.

AIR QUALITY

The objective of the BLM's air resource program is to maintain or improve air quality within National Ambient Air Quality Standards (NAAQS), achieve State Implementation Plan (SIP) goals for non-attainment areas, reduce emissions from point/non-point sources, and improve BLM's ability to understand and predict the effects of changing climatic regimes and atmospheric conditions that may cause ecological changes in climate-stressed environments.

Open Areas, Dry Washes, and River Beds: The control of airborne dust from open areas, dry washes and river beds is addressed in Arizona Rules and Regulations for Air Pollution Control - R9-3-404 A-C.

Roadways and Streets: Regulation, R9-3-405 A prohibits the use, repair, building, or rebuilding of roadways without taking reasonable dust abatement measures.

Mineral Tailings: R9-3-408 addresses prohibition on permitting or allowing construction of mineral tailings piles.

Fire Management: R9-3-402 and 403 direct BLM to follow permitting procedures before conducting any prescribed burning projects, to ensure that smoke from fires does not degrade air quality. Section 118 of the Clean Air Act (49.501 of the Arizona Laws Relating to Environmental Quality) charges the Arizona

Department of Environmental Quality to protect the health and welfare of Arizona residents from adverse impacts of air pollution. Those wishing to conduct prescribed burns must contact the Arizona Department of Environmental Quality.

VEGETATION MANAGEMENT

The Federal Land Policy and Management Act mandates BLM to manage vegetation resources under the principles of multiple use and sustained yield to maintain or improve biological diversity. This planning effort has categorized lands supporting native vegetation communities into two distinct types: (1) rangelands and (2) riparian areas and wetlands.

Rangeland Resources

BLM manages its grazing program under provisions of the Taylor Grazing Act of 1934, the Federal Land Policy and Management Act of 1976, and the Public Rangelands Improvement Act of 1978. These acts, along with Title 43, Code of Federal Regulations Part 4100 and associated BLM manual policy, authorize the following:

- Issuance of grazing permits and leases.
- Detection and abatement of unauthorized use.
- Use supervision.
- Livestock grazing management.
- Range improvement facilities and treatments.

Management of rangelands in the planning area is guided by the Phoenix Resource Management Plan (BLM 1988), the Eastern Arizona Grazing EIS (BLM 1986) and the associated Rangeland Program Summary to the Grazing EIS (BLM 1987b). The Eastern Arizona Grazing EIS provides regulations for managing rangelands and for the livestock grazing program through the following objectives:

- Restore and improve rangeland condition and productivity.
- Provide for use and development of rangeland.
- Maintain and improve habitat and viable wildlife populations.
- Control future management actions.
- Promote sustained yield and multiple use.

Riparian and Wetland Resources

Legal authority for BLM's management of riparian-wetland areas is based on many laws and executive orders, including the following:

- Taylor Grazing Act of 1934.
- Endangered Species Act of 1973.
- Federal Land and Policy Management Act of 1976.
- Emergency Wetland Resources Act of 1986.
- Water Quality Act of 1987.

- Executive Order 11988 (Floodplain Management).
- Executive Order 11990 (Protection of Wetlands).

On January 22, 1987, BLM issued its riparian area management policy, which defined the term riparian area, set management objectives, and outlined specific policy direction. This policy is the basis for BLM Manual 1737 (Riparian-Wetland Area Management), the Bureau-wide Riparian-Wetland Initiative for the 1990's, and the Arizona Riparian-Wetland Area Management Strategy. Riparian management plans will be consistent to the extent practicable, with State of Arizona riparian habitat, protection policy, "Protection of the Riparian Areas" February 14, 1991 (Executive Order 91-6).

FISH AND WILDLIFE MANAGEMENT

Legislation, including the Federal Land Policy and Management Act, the Endangered Species Act, Public Rangelands Improvement Act, and the Sikes Act, directs BLM to manage habitats to meet the needs of fish and wildlife.

The Endangered Species Act of 1973 is the authority for conserving endangered and threatened species on public lands. Section 4(f) of this act directs the Secretary of the Interior to develop and implement recovery plans for the conservation and survival of endangered species. Section 7(a)(1) requires each federal agency to carry out proactive measures to recover listed species. Section 7(a)(2) requires each agency to avoid jeopardizing the existence of listed species through its actions.

BLM Manual 6840 does the following:

- Outlines the conservation of threatened and endangered species and the habitat on which they depend.
- Ensures that all actions that BLM authorizes, funds, or implements comply with the Endangered Species Act.
- Requires cooperation with the U.S. Fish and Wildlife Service in the planning and recovery of threatened and endangered species.
- States BLM's policy for special status candidate species.

BLM will use collaborative information and services from state agencies, federal agencies, universities, conservation groups, and organizations for proposals, the implementing of wildlife improvements, or any other wildlife management action. This plan amendment meets Sikes Act (1974) requirements for a wildlife habitat management plan. Section 205 of the National Environmental Policy Act requires interdisciplinary consultation.

CULTURAL RESOURCES

The BLM administers cultural resources according to mandates set forth by a number of regulations, laws and acts, including the Federal Land Policy and Management Act (FLPMA) of 1976, the National Historic Preservation Act (NHPA) of 1966, and the Archaeological Resources Protection Act (ARPA) of 1979.

In Arizona, the BLM also operates under the terms of a national Programmatic Agreement (PA) and a Protocol with the Arizona State Historic Preservation Officer (SHPO). This Protocol guides inventory, data

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recovery and impact mitigation procedures for cultural resources eligible for listing or listed on the National Register of Historic Places that are affected by BLM undertakings and actions.

The National Historic Preservation Act requires the BLM to inventory and preserve significant cultural properties located on land under its administration. In compliance with this legislation, the BLM's cultural resource management program at the field office level provides for: 1) collection and assimilation of information about the nature of the cultural resources known and expected to occur within the field area, 2) assessment of cultural resource use potentials, 3) assignment of resource uses, 4) planned steps to protect or realize assigned uses, and 5) authorization of appropriate uses.

To comply with the National Historic Preservation Act, activities that may affect properties listed on or eligible for the National Register of Historic Places are evaluated and potential impacts analyzed and mitigated under the term's of BLM's national cultural resources Programmatic Agreement and Arizona Protocol..

The Archaeological Resources Protection Act does the following:

- Prohibits the attempt or excavation, removal, damage, or trafficking of archaeological resources from public land by unauthorized persons.
- Provides for the authorized removal and excavation of cultural resources through a permitting process.
- Requires the Secretary of the Interior to prepare plans to determine the nature and extent of archaeological resources and to schedule land surveys in areas likely to contain the most scientifically valuable archaeological resources.

Native American Consultation

BLM must consult with Native Americans while preparing planning documents such as RMPs to meet its responsibilities under the following:

- Federal Land Policy and Management Act National Environmental Policy Act.
- American Indian Religious Freedom Act.
- Executive Order 13007.

These responsibilities require BLM to inform tribal officials and representatives of opportunities to comment on and participate in developing BLM use plans, specifically (1) requesting their views, (2) asking which people such as tribal leaders or religious practitioners it should contact, and (3) making a good faith effort to pursue those contacts and elicit Native American interests and concerns.

LIVESTOCK GRAZING

Actions pertaining to livestock grazing management conform to the Eastern Arizona Grazing EIS (BLM 1986), provisions of the Taylor Grazing Act of 1934, and the Public Rangeland Improvement Act of 1978. All proposed grazing and rangeland improvement practices conform to the Best Management Practices developed by the Arizona Department of Environmental Quality for livestock grazing. BLM administers livestock grazing under the 43 CFR 4000 regulations consistent with achieving land use plan objectives.

MINERAL MANAGEMENT

Overall guidance on managing mineral resources appears in the following:

- General Mining Law of 1872, as amended.
- Mining and Minerals Policy Act of 1970.
- Sec. 102 (a)(12) of the Federal Land Policy and Management Act.
- National Materials and Minerals Policy, Research and Development Act of 1980.
- State of Arizona statutes and rules.
- BLM's Mineral Resources Policy of 1984.

Section 3809.2-2 of Title 43 Code of Federal Regulations covers concerns for air, water, and solid waste. This regulation requires all operators to comply with state pollution control standards.

Locatable Minerals: Development of locatable minerals is regulated by BLM's Surface Management Regulations at 43 CFR 3809. The 3809 regulations require mineral exploration and development under the mining laws to prevent unnecessary or undue degradation of other resources. Mining activities will be evaluated on a case-by-case basis during the life of this plan.

Saleable Minerals: The Material Act of 1947 and 43 CFR 3600 provide for the disposal and regulation of mineral materials. BLM will administer the sales of mineral materials to the public on a case-by-case basis.

Leasable Minerals: The Mineral Leasing Act of 1920, Geothermal Steam Act of 1970, and 43 CFR 3100 to 3500 provide the regulatory framework for issuing mineral leases. BLM attaches stipulations to leases to protect natural and cultural resources in a lease area.

HAZARDOUS MATERIALS

BLM manages hazardous materials in compliance with the following statutes:

- Resource Conservation and Recovery Act (RCRA), or Public Law 94-580.
- Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), or Public Law 96-510, also known as the Superfund Act.
- Superfund Amendment Reauthorization Act (SARA) Title III (E.O. 12580).

BLM responsibilities under these acts include conformance with federal RCRA enforcement regulations pertaining to the storage, handling, and disposal of hazardous materials and reporting unpermitted hazardous material discharges under the provisions of CERCLA. The BLM Tucson Field Office hazardous materials specialist and law enforcement will coordinate environmental conditions such as spills or illegal dumping and initiate the proper response.

LAND TENURE AND LAND USE AUTHORIZATIONS

The Land Tenure Amendment to the Safford District Resource Management Plan (BLM 1994c) made land tenure decisions for the Empire-Cienega Planning Area while the planning area was administered by the

BLM Safford District. The Empire-Cienega Long Term Management Area was one of 24 long term management areas (LTMAs) delineated in the Land Tenure Plan Amendment. The boundaries of the Empire-Cienega LTMA correspond to the current planning area boundary. In managing all 24 LTMAs BLM will do the following:

- Intensively manage the public lands for their multiple resource values as defined in the Federal Land Policy and Management Act.
- Retain all public land (surface and subsurface estate) and possibly seek to acquire state and private lands within these areas.
- Consider land acquisitions on a case-by-case basis and consider economic impacts as well as natural resource impacts.

BLM may acquire land by exchange or purchase, considering four alternatives for private lands acquisitions:

- Land owner education.
- Entering into cooperative management agreements.
- Partial acquisition such as conservation easements.
- Full "fee simple title" acquisition.

The following are objectives for land acquisition within LTMAs:

- Acquire lands with high public values that compliment existing management programs within long term management areas.
- Consolidate ownership patterns within LTMAs to improve management efficiency.
- Improve service to the public.

Lands considered for acquisition will have one or more of the following characteristics:

- Riparian habitat.
- Watersheds of important riparian areas.
- High-value wildlife habitat, including critical habitat for threatened and endangered species and major migration corridors.
- Suitability for an administrative site.
- Suitability for developed recreation sites.
- Access to public lands.
- Significant cultural and paleontological properties.
- Other high public resources, such as inholdings in areas of critical environmental concern and other types of special management areas.

Land Use Authorizations: BLM will continue to issue land use authorizations on a case-by-case basis and in accordance with the approved resource management plan. BLM will issue rights-of-way within existing right-of-way routes, including joint use whenever possible.

OUTDOOR RECREATION

The Land and Water Conservation Fund Act of 1965 is the main authority that assures accessibility to outdoor recreation resources. This act serves as the basis for the objectives of the BLM recreation program:

- Provide quality outdoor recreation opportunities and experiences.
- Protect visitor health and safety and natural and cultural resources.
- Provide universally accessible facilities.
- Resolve user conflicts.

BLM has determined that segments of Cienega Creek are suitable for inclusion in the Wild and Scenic Rivers System and must be managed by the guidelines of the Wild and Scenic Rivers Act of 1968 during the interim and upon designation by Congress. This act selects certain rivers of the Nation having remarkable values, preserves them in a free-flowing condition, and protects their local environments for the "... benefit and enjoyment of present and future generations."

Commercial recreation uses, special events, and group activities will have to apply for special recreation permits. BLM considers these applications on a case-by-case basis and addresses them under Title 43 CFR, Sub-part 8372 (Special Recreation Permits, Other than on Developed Recreation Site). Other criteria applied to the permits come from the NEPA guidelines. These criteria ensure consistency with management objectives such as the following:

- Suitability.
- Mitigation of potential ground disturbance.
- Amount of traffic generated by the permit.
- Conflict with other uses.

2. BLM STANDARDS AND GUIDELINES FOR ACHIEVING RANGELAND HEALTH

BLM Standards and Guidelines for
Achieving Rangeland Health

The goals, objectives, and actions presented in this plan are intended to meet or exceed the standards required in the Bureau's Standards and Guidelines for Rangeland Health in Arizona. These standards and guidelines were developed in consultation with Resource Advisory Council and others. The Arizona standards and guidelines meet the requirements and intent of 43 Code of Federal Regulations, Subpart 4180 (Rangeland Health). These standards and guidelines are intended to provide a clear statement of agency policy and direction for those who use public lands, and for those who are responsible for their management and accountable for their condition.

The Fundamentals of Rangeland Health stated in 43 CFR 4180 are:

1. Watersheds are in, or are making significant progress toward, properly functioning physical condition, including their upland, riparian-wetland, and aquatic components; soil and plant conditions support infiltration, soil moisture storage and the release of water that are in balance with climate and landform and maintain or improve water quality, water quantity and the timing and duration of flow.

2. Ecological processes, including the hydrologic cycle, nutrient cycle and energy flow, are maintained, or there is significant progress toward their attainment, in order to support healthy biotic populations and communities.

3. Water quality complies with State water quality standards and achieves, or is making significant progress toward achieving, established Bureau of Land Management objectives such as meeting wildlife needs.

4. Habitats are, or are making significant progress toward being, restored or maintained for federal threatened and endangered species, federal Proposed, Category 1 and 2, federal candidate and other special status species.

The fundamentals of rangeland health combine the basic precepts of physical function and biological health with elements of law relating to water quality, and plant and animal populations and communities. They provide the direction for the development of resource objectives and the selection of appropriate management actions to achieve them.

ARIZONA STANDARDS AND GUIDELINES

Arizona Standards and Guidelines (S&G) for grazing administration have been developed through a collaborative process involving the Bureau of Land Management State S&G Team and the Arizona Resource Advisory Council. Together, through meetings, conference calls, correspondence, and Open Houses with the public, the BLM State Team and RAC prepared Standards and Guidelines to address the minimum requirements outlined in the grazing regulations. The Standards and Guidelines, criteria for meeting

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Standards, and indicators are an integrated document that conforms to the fundamentals of rangeland health and the requirements of the regulations when taken as a whole.

Upland sites, riparian-wetland areas, and desired resource conditions are each addressed by a standard and associated guidelines.

Standard 1: Upland Sites

Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate and landform (ecological site).

Criteria for meeting Standard 1:

Soil conditions support proper functioning of hydrologic, energy, and nutrient cycles. Many factors interact to maintain stable soils and healthy soil conditions, including appropriate amounts of vegetative cover, litter, and soil porosity and organic matter. Under proper functioning conditions, rates of soil loss and infiltration are consistent with the potential of the site.

Ground cover in the form of plants, litter or rock is present in pattern, kind, and amount sufficient to prevent accelerated erosion for the ecological site; or ground cover is increasing as determined by monitoring over an established period of time.

Signs of accelerated erosion are minimal or diminishing for the ecological site as determined by monitoring over an established period of time.

As indicated by such factors as:

- Ground Cover
  - litter
  - live vegetation, amount and type (e.g., grass, shrubs, trees, etc.)
  - rock
- Signs of erosion
  - flow pattern
  - gullies
  - rills
  - plant pedestaling

Exceptions and exemptions (where applicable):

- none

Guidelines:

1-1. Management activities will maintain or promote ground cover that will provide for infiltration, permeability, soil moisture storage, and soil stability appropriate for the ecological sites within management units. The ground cover should maintain soil organisms and plants and animals to support the hydrologic

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and nutrient cycles, and energy flow. Ground cover and signs of erosion are surrogate measures for hydrologic and nutrient cycles and energy flow.

1-2. When grazing practices alone are not likely to restore areas of low infiltration or permeability, land management treatments may be designed and implemented to attain improvement.

Standard 2: Riparian-Wetland Sites

Riparian-wetland areas are in properly functioning condition.

Criteria for meeting Standard 2:

Stream channel morphology and functions are appropriate for proper functioning condition for existing climate, landform, and channel reach characteristics. Riparian-wetland areas are functioning properly when adequate vegetation, land form, or large woody debris is present to dissipate stream energy associated with high water flows.

Riparian-wetland functioning condition assessments are based on examination of hydrologic, vegetative, soil and erosion-deposition factors. BLM has developed a standard checklist to address these factors and make functional assessments. Riparian-wetland areas are functioning properly as indicated by the results of the application of the appropriate checklist.

The checklist for riparian areas is in Technical Reference 1737-9 "Process for Assessing Proper Functioning Condition." The checklist for wetlands is in Technical Reference 1737-11 "Process for Assessing Proper Functioning Condition for Lentic Riparian-Wetland Areas." These checklists are reprinted on the pages following the Guidelines for Standard 3.

As indicated by such factors as:

- Gradient
- Width/depth ratio
- Channel roughness and sinuosity of stream channel
- Bank stabilization
- Reduced erosion
- Captured sediment
- Ground-water recharge
- Dissipation of energy by vegetation

Exceptions and exemptions (where applicable):

- Dirt tanks, wells, and other water facilities constructed or placed at a location for the purpose of providing water for livestock and/or wildlife and which have not been determined through local planning efforts to provide for riparian or wetland habitat are exempt.

- Water impoundments permitted for construction, mining, or other similar activities are exempt.

Guidelines:

2-1. Management practices maintain or promote sufficient vegetation to maintain, improve or restore riparian-wetland functions of energy dissipation, sediment capture, groundwater recharge and stream bank stability, thus promoting stream channel morphology (e.g., gradient, width/depth ratio, channel roughness and sinuosity) and functions appropriate to climate and landform.

2-2. New facilities are located away from riparian-wetland areas if they conflict with achieving or maintaining riparian-wetland function. Existing facilities are used in a way that does not conflict with riparian-wetland functions or are relocated or modified when incompatible with riparian-wetland functions.

2-3. The development of springs and seeps or other projects affecting water and associated resources shall be designed to protect ecological functions and processes.

Standard 3: Desired Resource Conditions

Productive and diverse upland and riparian-wetland plant communities of native species exist and are maintained.

Criteria for meeting Standard 3:

Upland and riparian-wetland plant communities meet desired plant community objectives. Plant community objectives are determined with consideration for all multiple uses. Objectives also address native species, and the requirements of the Taylor Grazing Act, Federal Land Policy and Management Act, Endangered Species Act, Clean Water Act, and appropriate laws, regulations, and policies.

Desired plant community objectives will be developed to assure that soil conditions and ecosystem function described in Standards 1 and 2 are met. They detail a site-specific plant community, which when obtained, will assure rangeland health, State water quality standards, and habitat for endangered, threatened, and sensitive species. Thus, desired plant community objectives will be used as an indicator of ecosystem function and rangeland health.

As indicated by such factors as:

- Composition
- Structure
- Distribution

Exceptions and exemptions (where applicable):

- Ecological sites or stream reaches on which a change in existing vegetation is physically, biologically, or economically impractical.

Guidelines:

3-1. The use and perpetuation of native species will be emphasized. However, when restoring or rehabilitating disturbed or degraded rangelands, non-intrusive, non-native plant species are appropriate for use where native species (a) are not available, (b) are not economically feasible, (c) cannot achieve ecological objectives as well as non-native species, and/or (d) cannot compete with already established non-native species.

3-2. Conservation of Federal threatened or endangered, proposed, candidate, and other special status species is promoted by the maintenance or restoration of their habitats.

3-3. Management practices maintain, restore, or enhance water quality in conformance with State or Federal standards.

3-4. Intensity, season and frequency of use, and distribution of grazing use should provide for growth and reproduction of those plant species needed to reach desired plant community objectives.

3-5. Grazing on designated ephemeral (annual and perennial) rangeland may be authorized if the following conditions are met:

- ephemeral vegetation is present in draws, washes, and under shrubs and has grown to useable levels at the time grazing begins;
- sufficient surface and subsurface soil moisture exists for continued plant growth;
- serviceable waters are capable of providing for proper grazing distribution;
- sufficient annual vegetation will remain on site to satisfy other resource concerns, (i.e., watershed, wildlife, wild horses and burros); and
- monitoring is conducted during grazing to determine if objectives are being met.

3-6. Management practices will target those populations of noxious weeds which can be controlled or eliminated by approved methods.

3-7. Management practices to achieve desired plant communities will consider protection and conservation of known cultural resources, including historical sites, and prehistoric sites and plants of significance to Native American peoples.

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3. RIPARIAN PROPER FUNCTIONING CONDITION ASSESSMENTS

Name of Riparian-Wetland Area **(Lotic Area):**_______________________________________

Date:_________ Area/Segment ID:______________________________ Miles:___________

ID Team Observers:____

Yes	No	N/A	HYDROLOGIC
			1) Floodplain inundated in "relatively frequent" events (1-3 years)
			2) Active/stable beaver dams
			3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
			4) Riparian zone is widening or has achieved potential extent
			5) Upland watershed not contributing to riparian degradation

Yes	No	N/A	VEGETATIVE
			6) Diverse age-class distribution (recruitment for maintenance/recovery)
			7) Diverse composition of vegetation (for maintenance/recovery)
			8) Species present indicate maintenance or riparian soil moisture characteristics
			9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events
			10) Riparian plants exhibit high vigor
			11) Adequate vegetative cover present to protect banks and dissipate energy during high flows
			12) Plant communities in the riparian area are an adequate source of coarse and/or large woody debris

Yes	No	N/A	EROSION DEPOSITION
			13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody debris) adequate to dissipate energy
			14) Point bars are revegetating
			15) Lateral stream movement is associated with natural sinuosity
			16) System is vertically stable
			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

(Revised 1995)
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REMARKS (Lotic Checklist)

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SUMMARY DETERMINATION

Functional Rating:

Proper Functioning Condition ________
Functional--At Risk ________
Nonfunctional ________
Unknown ________

Trend for Functional--At Risk:

Upward ________
Downward ________
Not Apparent ________

Are factors contributing to unacceptable conditions outside BLM's control or management?

Yes ________
No ________

If yes, what are those factors?

____Flow regulations
____Channelization
____Augmented flows
____Mining activities
____Road encroachment
____Other (Specify)________________________
____Upstream channel conditions
____Oil field water discharge

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Name of Riparian-Wetland Area (**Lentic Area**):_______________________________________

Date:_________ Area/Segment ID:______________________________ Acres:___________

ID Team Observers:____

Yes	No	N/A	HYDROLOGIC
			1) Riparian-wetland area is saturated at or near the surface or inundated in "relatively frequent" events (1-3 years)
			2) Fluctuation of water levels is not excessive
			3) Riparian-wetland zone is enlarging or has achieved potential extent
			4) Upland watershed not contributing to riparian-wetland degradation
			5) Water quality is sufficient to support riparian-wetland plants
			6) Natural surface or subsurface flow patterns are not altered by disturbance (i.e., hoof action, dams, dikes, trails, roads, rills, gullies, drilling activities)
			7) Structure accommodates safe passage of flows (e.g., no headcut effecting dam or spillway)

Yes	No	N/A	VEGETATION
			8) Diverse age-class distribution (recruitment for maintenance/recovery)
			9) Diverse composition of vegetation (for maintenance/recovery)
			10) Species present indicate maintenance of riparian-wetland soil moisture characteristics
			11) Vegetation is comprised of those plants or plant communities that have root masses capable of withstanding wind events, wave flow events, or overland flows (e.g., storm events, snowmelt)
			12) Riparian-wetland plants exhibit high vigor
			13) Adequate vegetative cover present to protect shorelines/soil surface and dissipate energy during high wind and wave events or overland flows
			14) Frost or abnormal hydrologic heaving is not present
			15) Favorable microsite condition (i.e., woody debris, water temperature, etc.) is maintained by adjacent site characteristics

Yes	No	N/A	SOILS-EROSION DEPOSITION
			16) Accumulation of chemicals affecting plant productivity/composition is not apparent
			17) Saturation of soils (i.e., ponding, flooding frequency and duration) is sufficient to compose and maintain hydric soils
			18) Underlying geologic structure/soil material/permafrost is capable of restricting water percolation
			19) Riparian wetland is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)
			20) Islands and shoreline characteristics (i.e., rocks, coarse and/or large woody debris) adequate to dissipate wind and wave event energies

(Revised 1995)

REMARKS (Lentic Checklist)

SUMMARY DETERMINATION

Functional Rating:

Proper Functioning Condition ________
Functional--At Risk ________
Nonfunctional ________
Unknown ________

Trend for Functional--At Risk:

Upward ________
Downward ________
Not Apparent ________

Are factors contributing to unacceptable conditions outside BLM's control or management?

Yes ________
No ________

If yes, what are those factors?

____Dewatering
____Mining activities
____Watershed condition
____Dredging activities
____Road encroachment
___Land ownership
____Other (specify)____

4. CULTURAL RESOURCE USE CATEGORIES

CULTURAL RESOURCE MANAGEMENT USE CATEGORIES

The BLM manages cultural resources for their information potential, their public and traditional uses, and to conserve their values for the future.

Use Categories

The BLM management system requires field offices to allocate cultural properties known and projected to occur in a planning area to appropriate use categories. Use categories establish what cultural resources and values need to be protected, and when or how use should be authorized. Cultural resources can be used in a variety ways, including research, traditional or ceremonial purposes, interpretive exhibits, educational field schools, experimental studies, and as resources "banks" to be conserved for future use.

Ideally, allocations are made in regional plans, local interdisciplinary plans, or project plans. When allocations have not been made in other planning decisions they should be made during the compliance process for land use authorizations. Allocation of use categories should be consistent with historic context documents and State Historic Preservation Plans. These categories are: 1) Scientific Use, 2) Conservation for Future Use, 3) Traditional Use, 4) Public Use, 5) Experimental Use, and, 6) Discharged from Management.

1. Scientific Use. This category applies to any cultural property determined to be available for consideration as the subject of scientific or historical study at the present time, using currently available research techniques. Study includes methods that would result in the property's physical alteration or destruction. This category applies almost entirely to prehistoric and historic archaeological properties, where the method of use is generally archaeological excavation, controlled surface collection and/or controlled, systematic data recovery.

2. Conservation for Future Use. Allocation to this category is reserved for any unusual cultural property which, because of scarcity, a research potential that surpasses the current state of the art, singular historic importance, cultural importance, architectural interest, or comparable reasons, is not currently available for consideration as the subject of scientific or historical study that would result in its physical alteration. A cultural property included in this category is deemed worthy of segregation from all other land or resource uses, including cultural resource uses, that would threaten the maintenance of its present condition or setting, as pertinent, and will remain in this use category until specified provisions are met in the future.

3. Traditional Use. A cultural resource known to be perceived by a specified social and/or cultural group as important in maintaining the cultural identity, heritage, or well-being of the group may be allocated to this use. Cultural properties assigned to this category are to be managed in ways that recognize the importance ascribed to them and seek to accommodate their continuing traditional use.

4. Public Use. A cultural property found to be appropriate for use as an interpretive exhibit in place, or for related educational and recreational uses by members of the general public may be allocated for public use. This category may also include buildings suitable for continued use or adaptive use, for example as staff housing or administrative facilities at a visitor contact or interpretive site.

5. Experimental Use. This category may be applied to a cultural property judged well-suited for controlled experimental study, to be conducted by BLM or others concerned with the techniques of managing cultural properties, which would result in the property's alteration, possibly including loss of integrity and destruction of physical elements. Committing cultural properties or the data they contain to loss must be justified in terms of specific information that would be gained and how it would aid in the management of other cultural properties. **Cultural properties with strong research potential, traditional cultural importance, or good public use potential are not assigned to this category.**

6. Discharged From Management. Cultural properties that have no remaining identifiable use are assigned to this category. Most often this category involves prehistoric and historic archaeological properties, such as small surface scatters or artifacts or debris, whose limited research potential is effectively exhausted as soon as they have been documented. Also, more complex archaeological properties that have had their salient information collected and preserved through mitigation or research may be discharged from management, as should cultural properties destroyed by any natural event or human activity. Properties discharged from management remain in the inventory, but are removed from further management attention and do not constrain other land uses. Particular classes of unrecorded cultural properties may be named and described in advance as dischargeable upon documentation, but specific cultural properties must be inspected in the field and recorded before they may be discharged from management.

CULTURAL RESOURCE USE CATEGORIES AND NATIONAL REGISTER SIGNIFICANCE

Cultural resource use categories are based in part upon requirements stated in the National Historic Preservation Act. This legislation requires the BLM to assess cultural properties to determine their historic significance, integrity and potential for listing on the National Register of Historic Places, and identify possible effects that any undertakings might have on cultural properties eligible for listing or listed on the National Register.

To be considered eligible for listing on the National Register a property must meet three broad qualifications: 1) Generally, it must be at least fifty (50) years old, 2) it must have significance, or embody recognizable importance and, 3) it must retain historic integrity.

A property may embody one or more of several different types of values which represent the importance of a property and imply the reason that it should be preserved. These values are classified under the four National Register Criteria for Evaluation:

Criterion A: Event. Properties can be eligible for the National Register if they are associated with events that have made a significant contribution to the broad patterns of our history.

Criterion B: Person. Properties may be eligible for listing on the National Register if they are associated with the lives of persons significant in our past.

Criterion C: Design/Construction. Properties may be eligible for the National Register if they embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.

Criterion D: Information Potential. Properties may be eligible for the National Register if they have yielded, or may be likely to yield, information important in prehistory or history.

CULTURAL RESOURCE USE CATEGORIES- LAS CIENEGAS RESOURCE MANAGEMENT PLAN

Cultural Resources Allocated to Public Use

Empire Ranch Headquarters

The land use proposals and implementation plans for cultural resources presented in Chapter 2 include allocation of the historically significant buildings at the Empire Ranch Headquarters to Public Use under all alternatives. If feasible, selected sites or properties outside the headquarters area could be allocated to Public Use in the future under Alternatives 2 and 3, but only if funds and staff are available to ensure that no adverse impacts would occur from such use.

Properties allocated to Public Use may be used as in-place interpretive exhibits, for related educational and recreational uses by members of the general public, and for continued or adaptive use such as staff housing, or administrative facilities at a visitor contact or interpretive site.

Cultural Properties Outside the Empire Ranch Headquarters

Archaeologists understand very little about the origin, technology, lifestyle and day-to-day activities of the prehistoric people who lived in what is now the planning area. Much of what is understood is based on archaeological materials recovered from two sites in the Cienega Valley that were excavated during the 1950's and 1980's. Since 1988, when the BLM acquired the land making up the planning area, Class III cultural resource inventories have slowly added information to the data base. Similarly, historical information about the planning area is being gradually accumulated.

In the future, as more information is collected, analyzed and available for use in constructing management strategies, sites of various types and ages could be selected and developed for interpreting educational information to the public about the prehistoric and historic people who inhabited the planning area. Provisions could be made to allocate some properties from Scientific Use to Public Use. Interpretation could range from merely placing interpretive panels or kiosks near or at selected sites to developing specific properties for visitation by the public. Such development could include interpretive trails, displays, signs and guided tours. When needed, archaeological efforts at the sites could be designed to include participation of volunteers working under the guidance of professional archaeologists. The object would be to provide information to the general public, and educational opportunities to lay people who wish to be actively involved in archaeology.

Cultural Resources Allocated to Scientific Use

The land use proposals and implementation plans for cultural resources presented in Chapter 2 provide for allocation of the Matty Canyon site complex, Sandford Homestead site and the Pump Canyon site to Scientific Use under Alternatives 2, 3, and 4. Under this use, these properties would be available for scientific and historical study by qualified researchers and scholars. Scientific study of these sites could include archaeological excavation, controlled surface collection, or some type of controlled systematic data recovery. All such data collection would require submission of detailed research proposals conforming to Federal and State standards and requirements. Individual project efforts would be designed to disturb only a small portion of a respective site, leaving undisturbed materials for future study.

As information is compiled through future cultural resource surveys and study of currently documented sites, additional properties may be allocated to Scientific Use.

Cultural Resources Allocated to Traditional Use

Representatives of the Tohono O'odham Nation, San Carlos Apache Tribe, and the Hopi Tribe have stated their interests in noncommercial collection of bear grass, cottonwood root, acorns and several species of medicinal/ceremonial herbs. Collection of these plants and materials would be carried out in a manner that would not kill individual plants or deplete individual populations.

Cultural Resources Allocated to Experimental Use or Discharged from Management

As data are collected and added to the existing body of information about the cultural resources in the planning area, some properties may be allocated for future conservation, experimental use or discharged from management.

CULTURAL RESOURCE USE CATEGORIES AND CORRESPONDING MANAGEMENT OBJECTIVES

Cultural resource management objectives are established through consideration of use categories and may be defined in a regional land use plan, a local land use plan, or a Cultural Resource Project Plan (CRPP). A CRPP documents the type, significance, eligibility status, preservation and protection needs and the uses prescribed for a particular site or group of sites.

A Historic Structures Report (HSR) was written by the National Park Service, under a contract by the BLM, for the Empire Ranch House and the Ranch Hand's House. The Empire Ranch House is listed on the National Register of Historic Places and the surrounding historic buildings are considered eligible for listing. These HSR's provide preservation prescriptions for both structures and are being used as guides for stabilization/preservation currently underway through an agreement between the BLM and Empire Ranch Foundation. This work is being done to meet preservation requirements mandated by the National Historic Preservation Act. A CRPP has been written for the Empire Ranch House . CRPP's will be written for the other historic buildings at the ranch headquarters as well as other selected cultural resources in the planning area.

5. VISUAL RESOURCE MANAGEMENT CLASS OBJECTIVES

Bureau Manual 8410, Visual Resource Inventory (BLM 1986), places the management of visual resources (scenic values) into four management classes.

Class 1 - The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes but does not preclude very limited management activity. The level of change of the characteristic landscape should be very low and must not attract attention.

Class 2 - The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

Class 3 - The objective of this class is to partially retain the existing character of the landscape. The level of activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

Class 4 - The objective of this class is to provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. Every attempt should be made, however, to minimize the impact of these activities through careful location, minimal disturbance and repeating the basic elements.

6. AREAS OF CRITICAL ENVIRONMENTAL CONCERN EVALUATIONS

ACEC nominations were submitted to BLM for Cienega Creek by the Nature Conservancy, the Arizona Game and Fish Department, and Jeff Williamson. The Cienega Creek proposals were modified through the Sonoita Valley Planning Process into two alternatives. The first alternative is the Empire-Cienega ACEC, which includes all public lands within the Empire-Cienega Planning Area except for the public lands now within the Appleton-Whittell ACEC. The Appleton-Whittell would remain a separate ACEC. The second alternative is the Cienega Creek ACEC, which includes a smaller area of public lands surrounding the perennial length of Cienega Creek. An additional proposal for an ACEC including Nogales and Little Nogales Springs was also evaluated. The Empire-Cienega ACEC proposal has been included in Planning Alternatives 2 and 4 and the Cienega Creek ACEC and Nogales Springs ACEC proposals have been included in Planning Alternative 3.

EMPIRE-CIENEGA ACEC (ALTERNATIVES 2 AND 4)

The Empire-Cienega Planning Area appears to meet the importance and relevance criteria needed to become eligible as an Area of Critical Environmental Concern. The proposed Empire-Cienega ACEC includes all public lands within the Empire-Cienega Planning Boundary (Map 2-10) with the exception of public lands currently within the Appleton-Whittell ACEC (the Research Ranch). The proposed Empire-Cienega ACEC includes the entire perennial portion of Cienega Creek, perennial segments of Empire Gulch, Gardner Canyon, Mattie Canyon, and numerous perennial springs including Nogales and Little Nogales Springs. Also included are some outstanding examples of rare mesquite bosque, sacaton grasslands, and desert grasslands.

Relevance. The proposed Empire-Cienega ACEC includes a variety of unique and rare vegetative communities including cottonwood-willow riparian areas, cienegas, mesquite bosques, sacaton grasslands, desert grasslands, and oak woodlands. These communities support a diverse assemblage of plants and animals, many of which are federally listed or identified as species of special concern.

Cienega Creek is the main drainage of the proposed Empire-Cienega ACEC. The 20+ mile riparian zone supports a variety of obligate species, including several federally listed species and many species proposed for state species of special concern.

Cienega Creek provides essential habitat for the Gila topminnow, a federal endangered and proposed state species of special concern. The creek is listed number one for protection by the desert fisheries recovery team and is designated as one of five critical habitats needed for the future survival of the Gila topminnow. The stream is one of the last in Arizona supporting an intact native fish fauna uncontaminated by exotic fish. Cienega Creek also provides habitat for the Gila chub, which is candidate for federal listing. Other special status species found along the creek that require riparian habitat include the Huachuca water umbel, Mexican garter snake, lowland leopard frog, Chiricahua leopard frog, yellow-billed cuckoo, and Southwest willow flycatcher. Sacaton grasslands along Cienega Creek support populations of the rare Botteri's sparrow. Special management is needed to protect and enhance the resources of Cienega Creek. A rigorous monitoring program for native fish populations is needed to detect any threats to their survival, such as contamination of Cienega Creek by exotic fish. The number of residences and stock ponds in the watershed poses a

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constant threat of such contamination, and monitoring will allow for timely management actions should such a contamination occur.

The upland areas in the proposed Empire-Cienega ACEC are integral to the health of the watershed and to Cienega Creek and its tributaries. The desert grasslands are some of the finest examples of native grasslands and support populations of the rare grasshopper sparrow and Baird's sparrow as well as herds of pronghorn, mule deer, and white-tail deer. The semidesert grasslands include agave habitats, which provide foraging areas for the lesser long-nosed bat, a federal endangered species.

Soils on terraces adjacent to incised perennial reaches of Cienega Creek and intermittent incised drainages are unstable and represent a natural hazard. These soils have the potential to pipe (internally erode) and headcut. Soils that exhibit these characteristics are found as components in soil mapping units 16a and 27a. Both the soil piping and headcutting processes supply large amounts of sediment to the Cienega Creek system. These sediments may impact native fish habitats. Special Management is needed to reduce sediment from these areas and protect public safety.

Importance. The proposed Empire-Cienega ACEC includes five of the rarest habitat types in the American Southwest. The marsh communities found along Cienega Creek have national significance as some of the last, best examples of relatively intact cienegas. Until the late 1800's cienega communities were relatively common components of southwestern riparian systems. Over the last 100 years, the majority of cienegas have disappeared due to declining water tables, channel erosion, and conversion to agriculture (See Hendrickson and Minckley 1985, Desert Plants 6(3): 130-175). The cottonwood-willow riparian community along Cienega Creek and its tributaries is considered the rarest forest type in the United States based upon studies conducted by The Nature Conservancy. Special management is needed to ensure the perpetuation and protection of these wetlands. The sacaton-predominated native grassland occurs in the floodplains adjacent to the riparian areas and is one of the largest, intact tracts remaining in the Southwest, hosting many declining avian grassland species. Large mesquite bosques, a rare woodland community, also occur adjacent to the riparian areas of Cienega Creek. The upland areas include large expanses of high-quality native semi-desert grasslands.

The native fish habitats in the perennial flows of Cienega Creek are vulnerable to degradation from adverse land and water management practices. The loss of surface flows in Cienega Creek would jeopardize not only the populations of native fish, including the endangered Gila topminnow, but habitat for a variety of riparian-dependent wildlife species.

Both Chiricahua leopard frogs and lowland leopard frogs, species of special concern, have been found throughout the Cienega Creek watershed at several locations. The leopard frog complex is of special concern in Arizona due to documented reductions as a result of reduction in wetland habitats, air pollution, and predation by introduced bullfrogs.

The natural resource values of Cienega Creek are dependent on the continued surface flow of water in the creek. As residential and agricultural development occurs in Sonoita; competing demands for water may threaten the surface flow. The acquisition and monitoring of instream flow water rights is needed to protect the riparian community.

The Empire-Cienega Resource Conservation Area has recently been designated as a Continentally Important Bird Area by the American Bird Conservancy.

Unstable soils that pipe and headcut pose significant threat to human life and safety in areas where roads exist. The process of soil piping or internal erosion is characterized initially by cracks or depressions on the surface. These features evolve into large sinkholes, which can occur both at the surface or underground within the soil profile. In areas adjacent to incised channels, surface flows enter the soil through the soil, water moves laterally in the soil and exits into the incised channels. As this process occurs large sinkholes have the potential to form at the surface or within the soil.These sinkholes become a safety hazard when they form under existing roads. The soil material above these sinkholes may collapse due to vehicle use and natural processes.

Goals. Protect and enhance watershed, grassland, and threatened/endangered wildlife resources, emphasizing total ecosystem management. Reduce the safety hazard caused by areas of unstable soils and reduce the amount of sediment production from these areas.

Objectives

1. Resolve non-federal land use conflicts.
2. Maintain adequate instream flows to support aquatic and riparian resources.
3. Maintain water quality to support aquatic, riparian and fish and wildlife values.
4. Maintain or improve riparian condition to meet objectives for *Proper functioning Condition (PFC), T/E* fish and wildlife, including but not limited to a combination of maintenance of adequate woody species regeneration, promotion of mixed-aged stands of woody species, promotion of mature cottonwood overstory, and maintenance of cienega habitats.
5. Maintain or improve upland condition to meet objectives for proper functioning condition and desired future conditions of uplands.
6. Minimize surface disturbance and erosion through adequate controls on recreational activities, livestock grazing and other human uses.
7. Educate the public regarding riparian and threatened/endangered wildlife issues and management needs.
8. Promote the recovery of the Gila Topminnow.
9. Increase stability in the soil piping and headcutting areas.
10. Maintain or improve water quality in the Cienega Creek system.
11. Stabilize incised channel banks within these unstable soil areas.
12. Reduce surface disturbance and vehicle use within these areas of soil piping and headcutting.
13. Increase public safety.

Management Prescriptions

1. Propose designation of about 49,000 acres of land as an ACEC.
2. Acquire non-federal lands within the ACEC boundaries and incorporate these acquired lands as part of the ACEC.
3. Acquire water rights including instream flow rights for Cienega Creek sufficient to support aquatic fish and wildlife resources and riparian and aquatic habitats..
4. Do not open ACEC to mineral entry and do not permit mineral material sales or surface occupancy for oil and gas leases within the ACEC.
5. Limit motorized vehicles to designated roads and close non-essential roads.
6. Minimize building of recreation and livestock developments in the 100- year flood plain. Limit developments to those that are needed to reduce impacts on riparian areas within the ACEC.
7. Limit livestock use in riparian areas of the ACEC except for crossing lanes, watering areas and specific areas where livestock grazing is identified and used as a management tool to achieve a riparian or aquatic related resource objective.
8. Implement a livestock grazing system consistent with the goals and objectives of the ACEC.

9. Prohibit recreational gold-panning, dredging, or sluicing within the ACEC.
10. Prohibit overnight camping within the riparian areas of the ACEC (defined as within 100 feet of the water's edge). Camping within the 100 year floodplain would be permitted if consistent with management prescriptions for the remainder of the planning area.
11. Limit crossings of Cienega Creek for group activities to dry crossings, established road/trail crossings, or at the designated crossings identified in Figure 2-2 (Alternative 2) and Figure 2-7 (Alternative 4).
12. Develop educational brochures and signs promoting public awareness of threatened and endangered fish and wildlife and riparian resources and their needs.
13. Introduce Gila topminnow from Cienega Creek into available habitats (as fully protected) to provide a refugia for the Cienega Creek population.
14. Include the ACEC in a right-of-way avoidance area. Access routes for maintenance of existing and future utility lines will not cross perennial reaches of Cienega Creek except at designated crossings.
15. Implement the Wood Canyon Watershed Activity Plan (BLM 1989) by doing the following:
    - Find and monitor sinkholes and headcutting areas.
    - Close to vehicular traffic areas that exhibit a high degree of soil piping and headcutting.
    - In these unstable areas relocate existing and future roads away from incised channels.
    - Reduce the amounts of overland flows reaching these unstable areas by diverting flows or increasing vegetative cover in adjacent areas.
    - Stabilize and rehabilitate shallow incised channels to reduce lateral flow by structural or vegetative methods.
    - Stabilize incised channel banks with increased riparian vegetation where possible.
    - Decrease the depth of intermittent incised channels through structural methods to retain sediments.
16. Coordinate with surrounding land owners and managers, including the Forest Service, Arizona State Land Department, and Pia and Santa Cruz Counties to maintain or improve linkages of undeveloped lands in the region.
17. Coordinate with the Forest Service through the Forest Plan Revision process to consider related designations such as research natural areas for adjacent lands such as the western Whetstone Mountains area.
18. Implement a vegetation treatment program to aid in restoration of biological resources and processes.

CIENEGA CREEK ACEC (ALTERNATIVE 3)

Cienega Creek appears to meet the importance and relevance criteria needed to become eligible as an area of critical environmental concern. The proposed Cienega Creek ACEC (Map 2-16) includes the entire perennial portion of Cienega Creek and perennial reaches of Gardner Canyon, Empire Gulch, and Mattie Canyon. Also included are mesquite bosque and sacaton grasslands adjacent to the riparian The proposed ACEC is located in:

T18S R18E, Sections 6 and 7
T18S R17E Sections 12, 13, 14, 23, 24, 26, 27, 34, and 35
T19S R17E, Sections 2, 3, 9, 10, 11, 14, 15, 16, 21, 22, 23, 26, 27, 28, 29, 32, 34
T20S R17E, Sections 2, 3, 10, and 11

Relevance. Cienega Creek provides essential habitat for the Gila topminnow, a federal endangered and proposed state wildlife of special concern species. The creek is listed number one for protection by the Desert Fisheries Recovery Team and is designated as one of five critical habitats needed for the future survival of the Gila topminnow. The stream is one of the last in Arizona supporting an intact native fish

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fauna that is uncontaminated by exotic fish. Cienega Creek also provides habitat for the Gila chub, which is a candidate for federal listing. Other species of concern found along the creek that require riparian habitat include the Mexican garter snake, lowland leopard frog, yellow-billed cuckoo, and Southwest willow flycatcher.

Special management is needed to protect and enhance the resources of Cienega Creek. A rigorous monitoring program for native fish populations is needed to detect any threats to their survival such as contamination of Cienega Creek by exotic fishes. The number of residences and stock ponds in the watershed pose a constant threat of such contamination. Monitoring will allow for timely management actions should exotic fish contaminate Cienega Creek.

Soils on terraces adjacent to incised perennial reaches of Cienega Creek and intermittent incised drainages are unstable and represent a natural hazard. These soils have the potential to pipe (internally erode) and head cut. Soils with these characteristics are found as components in soil mapping units 16a and 27a. Both soil piping and headcutting supply large amounts of sediment to the Cienega Creek system. These sediments may degrade native fish habitats. Special management is needed to reduce sediment from these areas and protect public safety.

Importance. The proposed Empire-Cienega ACEC includes four of the rarest habitat types in the American Southwest. The marsh communities along Cienega Creek have national significance as some of the last, best examples of relatively intact cienegas. Until the late 1800s cienega communities were relatively common components of southwestern riparian systems. Over the last 100 years, most cienegas have disappeared due to declining water tables, channel erosion, and conversion to agriculture (See Hendrickson and Minckley 1984). The cottonwood-willow riparian community along Cienega Creek and its tributaries is considered the rarest forest type in the United States according to studies conducted by The Nature Conservancy. Special management is needed to ensure the perpetuation and protection of these wetlands. The sacaton-predominated native grassland grows in the floodplains next to the riparian areas. One of the largest, intact tracts remaining in the Southwest, this grassland hosts many declining avian grassland species. Large mesquite bosques, a rare woodland community, also grow next to the riparian areas of Cienega Creek.

The native fish habitats in the perennial flows of Cienega Creek are vulnerable to degradation from adverse land and water management practices. The loss of surface flows in Cienega Creek would jeopardize not only the populations of native fishes, including the endangered Gila topminnow, but habitat for a variety of riparian-dependent wildlife species.

Both Chiricahua leopard frogs and lowland leopard frogs, species of special concern, have been found throughout the Cienega Creek watershed at several locations. The leopard frog complex is of special concern in Arizona due to documented decline as a result of reduced wetland habitats, air pollution, and predation by introduced bullfrogs.

The natural resources of Cienega Creek depend on the creek's continued surface flow of water. As Sonoita undergoes residential and agricultural, competing demands for water may threaten the surface flow. Instream flow water rights must be acquired and monitored to protect the riparian community.

Unstable soils that pipe and head cut significantly threaten human life and safety in areas that have roads. The process of soil piping or internal erosion is characterized initially by cracks or depressions on the surface. These features evolve into large sinkholes, either at the surface or underground within the soil profile. In areas next to incised channels, surface flows soak into the soil, move sideways, and exit into the

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incised channels. Through this process large sinkholes can form at the surface or within the soil. These sinkholes become hazardous when they form under roads and soil material above them collapse due to vehicle use and natural processes.

Goal. Protect and enhance aquatic, riparian, and associated threatened and endangered wildlife species, emphasizing total ecosystem management.

Objectives

1. Resolve nonfederal land use conflicts.
2. Maintain adequate instream flows to support aquatic and riparian resources.
3. Maintain water quality to support aquatic, riparian, and fish and wildlife values.
4. Maintain or improve riparian condition to meet goals for proper functioning condition *(PFC)* and threatened and endangered fish and wildlife, including a combination of the following:
   - Maintaining adequate woody species regeneration.
   - Promoting mixed-aged stands of woody species.
   - Promoting mature cottonwood overstory.
   - Maintaining cienega habitats.
5. Minimize surface disturbance and erosion through adequate controls on recreational activities, livestock grazing, and other human uses.
6. Educate the public on riparian and threatened and endangered wildlife issues and management needs.
7. Promote the recovery of the Gila topminnow.
8. Increase stability in the soil piping and headcutting areas.
9. Maintain or improve water quality in the Cienega Creek system.
10. Stabilize incised channel banks within these unstable soil areas.
11. Reduce surface disturbance and vehicle use within these areas of soil piping and headcutting.
12. Increase public safety.

Management Prescriptions

1. Propose designation of 4,418 acres as an area of critical environmental concern (ACEC).
2. Acquire non-federal lands within the ACEC boundaries and incorporate acquired lands into the ACEC.
3. Acquire water rights including instream flow rights for Cienega Creek sufficient to support aquatic fish and wildlife resources and riparian and aquatic habitats..
4. Keep the ACEC closed to mineral entry, and do not permit mineral material sales or surface occupancy for oil and gas leases within the ACEC.
5. Limit motorized vehicles to designated roads and close nonessential roads.
6. Minimize building of recreation and livestock developments in the 100-year floodplain. Limit developments to those needed to reduce impacts on riparian areas within the ACEC.
7. Limit livestock use in riparian areas of the ACEC except for crossing lanes, watering areas, and specific areas where livestock grazing is recognized and used as a management tool to achieve a riparian or aquatic-related resource objective.
8. Implement a livestock grazing system consistent with the ACEC's goals and objectives.
9. Prohibit recreational gold panning, dredging, or sluicing within the ACEC.
10. Prohibit camping within the riparian areas of the ACEC (defined as within 100 feet of the water's edge). Permit camping within the 100-year floodplain if consistent with management prescriptions for the remainder of the planning area.
11. Limit crossings of Cienega Creek for group activities to dry crossings, established road or trail crossings, or designated wet crossings shown in Figure 2-5.

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12. Develop educational brochures and signs promoting public awareness of threatened/endangered fish and wildlife and riparian resources and their needs.
13. Introduce Gila topminnow from Cienega Creek into available habitats (as fully protected) to provide refugia for the Cienega Creek population.
14. Include the ACEC in a right-of-way avoidance area. Prohibit access routes for maintaining existing and future utility lines from crossing perennial reaches of Cienega Creek except at designated crossings.
15. Implement the existing Wood Canyon Watershed Activity Plan by doing the following:
    - Find and monitor sinkholes and headcutting areas.
    - Close areas that exhibit a high degree of soil piping and headcutting to vehicular traffic.
    - Relocate existing and future roads in these unstable areas away from incised channels.
    - Reduce the amounts of overland flows reaching these unstable areas by diverting flows and increasing vegetative cover in adjacent areas.
    - Stabilize and rehabilitate shallow incised channels to reduce lateral flow by structural or vegetative methods.
    - Stabilize incised channel banks with increased riparian vegetation where possible.
    - Decrease the depth of intermittent incised channels by structural methods to retain sediments.

Note: A proposal for a Cienega Creek Soil Piping and Headcutting ACEC was incorporated into the proposals for The Empire-Cienega ACEC and the Cienega Creek ACEC.

Nogales Springs ACEC (ALTERNATIVE 3)

The Nogales and Little Nogales springs area appears to meet the importance and relevance criteria needed to become eligible as an area of critical environmental concern. The proposed Nogales Springs ACEC (Map 2-16) includes the entire block of public land surrounding Nogales and Little Nogales springs. The proposed ACEC is located in area:

T17S R18E, Sections 22, 26, 27, 28, 34, and 35
T18S, R18E, Sections 2, 3, and 11

Relevance. Nogales and Little Nogales springs provide important refugia habitat for the Cienega Creek population of the Gila topminnow, a federally endangered species. This fish has been reintroduced at these springs, which still have potential to support a successful topminnow reintroduction. Other springs on State Trust Lands in the upper Wakefield Canyon drainage also have potential as topminnow reintroduction sites. The Desert Fisheries Recovery Team has listed the Cienega Creek population as number one for protection, and Cienega Creek has been designated as one of five critical habitats the future survival of the Gila topminnow. Nogales and Little Nogales springs also provide habitat for the lowland leopard frog, a former federal candidate species, which is on the Arizona Game and Fish Department's proposed list of Wildlife of Special Concern.

Special management is needed to protect and enhance the resources of Nogales and Little Nogales springs. Recreational activities and livestock grazing must be restricted to protect these resources.

Importance. The native fish and amphibian habitats dependent on the perennial flows of Nogales and Little Nogales Springs are vulnerable to degradation from adverse land and water management practices. The loss of surface flows in Nogales and Little Nogales springs would eliminate this site as a refugium for the Cienega

Creek Gila topminnow population and would also cause a loss of habitat for a variety of riparian-dependent wildlife species.

The leopard frog complex is of special concern in Arizona due to documented declines as a result of reduced wetland habitats, air pollution, and predation by introduced bullfrogs.

The natural resource values of Nogales and Little Nogales springs depend on the continued surface flow of water at the springs. With residential and agricultural development in areas surrounding the planning area, competing demands for water may threaten the surface flow. Instream flow water rights need to be acquired and monitored to protect the riparian community. Nogales and Little Nogales springs support a mature riparian forest and diverse and abundant wildlife, including lowland leopard frogs. Mule deer, white-tail deer, and javelina frequent the area. The Nogales and Little Nogales springs complex is within the Empirita ranch. Special management is needed for this area to balance resource protection and needs of the livestock operation.

Travertine is being deposited at the springs. Their waters emerge from limestone, which provides a geologic environment suitable for forming travertine deposits. Travertine results from the precipitation of calcium carbonates from spring waters. The travertine deposits form ledges that can create dams and deep pools.

Goals. Protect and enhance the riparian and wildlife resources, emphasizing biological diversity and endangered species recovery. Protect the unique travertine geological processes and features.

Objectives

1. Maintain adequate flow at Nogales and Little Nogales springs to support aquatic and riparian resources.
2. Maintain water quality at Nogales and Little Nogales springs to support aquatic and riparian resources.
3. Maintain or improve riparian condition to meet goals for threatened and endangered wildlife, including maintaining adequate woody species regeneration and promoting mixed-aged stands of woody species.
4. Minimize surface disturbance and erosion by adequately controlling recreational activities, livestock grazing, and other human uses.
5. Promote the recovery of the Gila topminnow.
6. Protect the travertine features and travertine-forming processes from activities that would alter the natural cycle.

Management Prescriptions

1. Propose designating 411 acres of public land as an area of critical environmental concern (ACEC).
2. Maintain existing water rights and obtain enough instream flow water rights to Nogales and Little Nogales springs to support aquatic fish and wildlife and riparian and aquatic habitats.
3. Acquire nonfederal lands within the ACEC and incorporate these acquired lands as part of the ACEC.
4. Close the riparian areas within the ACEC to vehicular travel. Limit motorized vehicles to designated roads and close nonessential roads.
5. Keep the ACEC closed to mineral entry and do not permit mineral material sales or surface occupancy for oil and gas leases within the ACEC.
6. Minimize building of recreation and livestock developments in the 100- year floodplain. Limit developments to those needed to reduce impacts on riparian areas within the ACEC.
7. Limit livestock use in riparian areas of the ACEC except for crossing lanes, watering areas, and areas where livestock grazing is recognized and used as a management tool to achieve a riparian or aquatic-related resource objective.

8. Implement a livestock grazing system consistent with the goals and objectives of the ACEC, including building of fencing and waters needed under (7).
9. Prohibit recreational gold panning, dredging, or sluicing within the ACEC.
10. Prohibit collection of mineral specimens within the ACEC.
11. Prohibit camping within the ACEC's riparian areas defined as within 100 feet of the water's edge). Permit camping within the 100-year floodplain if consistent with management prescriptions for the rest of the planning area.
12. Limit group activity crossings of perennial streams to dry crossings, established road and trail crossings, or at the designated crossings shown in Figure 2-5.
13. Develop educational brochures and signs promoting public awareness of threatened and endangered fish and wildlife and riparian resources and their needs.
14. Introduce Gila topminnow from Cienega Creek into available habitats (as fully protected) to provide a refugium for the Cienega Creek population.
15. Include the ACEC in a right-of-way avoidance area. Do not allow access routes for maintenance of existing and future utility lines to cross perennial stream reaches except at designated crossings.

7. SUMMARY OF BIOLOGICAL OPINIONS

PROJECT NAME: CIENEGA CREEK INTERIM GRAZING PLAN

Date of Opinion: January 8, 1996

Species Affected: Gila topminnow, southwestern willow flycatcher, and lesser long-nosed bat.

Terms & Conditions

1) All actions are to be conducted in a manner that will minimize the take of the Gila topminnow and southwestern willow flycatchers and will minimize the suitability of the area for cowbird habitation.

1.1 - Implement the interim grazing plan as outlined in the BO description, with the exceptions found below.

1.2 - The timing, use, year-long rest, and grazing deferment of the various pastures will be as described. Riparian areas will be excluded from grazing.

1.3 - Livestock units on allotments shall not exceed 1,500 animal units/year.

1.4 - The fencing and construction of the 5 new riparian exclosures and the 6 sacaton pastures will be as specified in the Environmental Assessment.

1.5 - The 3 existing and 4 proposed crossing lanes shown in Table 3 of the BO may be used. The road crossing lane shown on the EA map (T 18 S, R 17 E, Sect. 34) shall be used in rotation with the other 7 proposed and existing lanes. Use of the crossing lanes will be determined through the biological planning process as described in the proposed action. Each lane can be used up to twice/year and all cattle must be moved thorough the lane within 10 days. Cattle must not be allowed to remain in the riparian zone.

1.6 - Existing riparian exclosures and water gaps will not be available to cattle (Karen Trap, A1, A2, A3, A4, Bahti's Bog, Lower 49 Gaps) after adjacent waters are completed. Construction of the represses should begin next to the water gaps. All proposed riparian exclosures and water gaps will be fenced to exclude cattle within one year from the date of this opinion.

1.7 - The fences of all riparian exclosures shall be inspected and maintained at least twice annually.

1.8 - The 14 new well, 6 well equip or redrills, and the associated pipelines must be located as specified in this BO.

1.9 - All new repressos must be located to minimize the likelihood of floods moving exotic fish and bullfrogs into topminnow habitat.

1. Represses should be located outside of the current 100-yr floodplain when possible.
2. Represses shall be located outside of the active channel except for Rattlesnake Tank, and tanks in the Empire Gulch and Cinco Ponds.

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3. Represses shall be constructed so runoff from precipitation captured by each represso is minimal.
4. The max. water depth in a represses may not exceed 4ft. at any spot.
5. The represses shall be used only when required to water cattle and shall be allowed to dry when no longer needed to water cattle.
6. If represses do not dry within 6 months after use ends, they shall be drained.
7. Represses should be located so access to the public, and potential for unauthorized release of non-native fish and bullfrogs, is minimized.

1.10. - The locations of the proposed upland plains developments shall be as specified in Tables 6 and 7 of this BO.

1.11. - Implement grazing rotation and pasture use and riparian exclosures and pastures within one year of the date of this opinion.

1.12. - Since no deadline for IGP is given, if the IGP remains in effect more than 5 years after the date of the opinion, the result would be a change in the agency action and reinitiation of section 7 consultation will be required.

2) Monitor the fish community and habitat including crossing lanes, grazed riparian zones, and represses to document the level of incidental take and to check for introduction of exotic fish and bullfrogs.

2.1 - Conduct basin-wide type fish habitat monitoring on at least 4 - 0.25 mile reaches of the creek every 3 years to determine habitat trends.

2.2 - A minimum of 5 habitats will be sampled annually in specified "Fall Fish count" sites prescribed by the AGFD. Blocknets and seines will be used for one pass sampling to determine relative abundance and populations trends and to screen for exotic fishes and bullfrogs.

2.3 - Riparian condition monitoring sites established in 1989 and reread in 1994 will be assessed every 5 years.

2.4 - Visually inspect and photograph the crossing lane and the area downstream from the lane for dead fish and sloughed banks in the period beginning with 1st day of use to the day after use (1-11 days). The inspections should be earlier rather then later.

2.5 - Visually inspect and photograph the grazed portion of Cienega creek near the Narrows annually for negative impacts to riparian condition caused by grazing.

2.6 - Visually inspect each represso 6 months after use to look for evidence of exotic fish and bullfrogs and to determine if draining the represso is necessary. If a sufficient dataset has built that shows these inspections to be unnecessary, BLM may cease this action after concurrence with the service.

2.7 - When the Biological Work Group meets, employ them to determine if the IGP is meeting its stated goals and objectives, and if the crossing lanes and the grazed portion of Cienega Creek are undergoing unacceptable degradation.

3) Maintain complete and accurate records of fish and avian populations and habitat monitoring of both the riparian zone and the uplands and all actions taken to implement the terms and conditions of the BO.

3.1 - Maintain complete and accurate records of fish populations and habitat monitoring of both the riparian zone and the uplands. Report on actions taken to implement the terms and conditions of this biological opinion. The report will include the dates that repressos are used, the dates they are inspected after use and if and evidence of exotic fish or bullfrogs are found.

3.2 - Copies of the records required in 3.1 above shall be provided annually to the Service on November 1st.

3.3 - Conduct annual surveys for the willow flycatchers before December 31, 1997, on Cienega Creek and its tributaries that may provide suitable habitat. The survey must follow the southwestern willow flycatcher survey protocol. Personnel conducting the surveys must have attended one of the flycatcher training sessions held annually.

a. If flycatchers are detected, determine their breeding status using the following criteria:
   - repeated presence of a non-singing southwestern willow flycatcher using vocalizations other than the primary song next to an individual exhibiting territorial behavior;
   - observation of a flycatcher nesting material;
   - observation of flycatchers copulating;
   - verification of a flycatcher nest;
   - observation of a flycatcher carrying food items;
   - observation of a juvenile flycatcher.

b. If breeding status is confirmed or suspected, continue monitoring efforts by visiting breeding locations at least once during each of the three 10-day periods of June and July or until observation indicates that flycatchers have stopped breeding efforts. Collect breeding and habitat data as outlined in the survey protocol and submit the completed data forms to AGFD Partners in Flight Program.

c. If flycatcher breeding status is confirmed or suspected, begin a brown-headed cowbird trapping program in the following year by April 1, using established protocols. Once a breeding flycatcher pair is located, assume nesting will occur in the subsequent years and conduct trapping program through the end of July, or until the flycatcher breeding season ends.
   i. Determine the number and location of traps based on the distribution of flycatcher along the drainage, but include a minimum of 2 traps.
   ii Check all traps at least once each day; individual traps should be checked at approximately the same time each day.
   iii. Maintain data on the brown-headed cowbirds trapping program, including:
      - data trapping is initiated and stopped;
      - locations of traps marked on a topographic map;
      - variations from the established protocol;
      - number and sex of brown-headed cowbirds and non-target species captured;
      - date of each capture.
   iv Euthanize all captured brown-headed cowbirds in a humane manner; dispose of the dead birds properly.
   v. Report to the Service each year on the survey and the trapping program.

d. Monitor for signs of nest parasitism such a cowbirds fledgling from flycatcher nest(s). If parasitism does occur, reinitiate consultation with the Service to alter management of mitigation measures as needed.

Conservation Recommendations

1. Consultation on road maintenance. Road maintenance and road closure should be addressed in the land use plan.
2. Feasibility of using metal tanks instead of dirt represses for watering livestock. Few repressos as possible should be used and used for as short a period as possible.
3. Identify unoccupied sites on the Empire-Cienega that are suitable for Gila topminnow. This effort should be used in consultation and coordination with the Service, AGFD, and Cienega Creek allotment permittee.
4. Conduct a riparian ecological site inventory.
5. Monitor water quality parameters.
6. Measure and monitor vegetation utilization by livestock.
7. Begin research on the effects of cattle grazing on paniculate agaves, and thus, lesser long-nosed bat.
8. Determine how often lesser long-nosed bat use the RCA and the agaves occurring there.
9. Address management strategies that enhance the probability of southwestern flycatchers.

PROJECT NAME: LIVESTOCK GRAZING PROGRAM, SOUTHEASTERN ARIZONA

Date of Opinion: September 26, 1997

Species Affected: **(NOTE: only species in bold apply to Empire-Cienega Planning Area Allotments.)** Kearney's blue star, Pima pineapple cactus, Nichol's turk's head cactus, Arizona hedgehog cactus, **Huachuca water umbel**, desert pupfish, spikedace, **Gila topminnow**, loach minnow, razorback sucker, (with critical habitat); **southwestern willow flycatcher**, (with critical habitat); cactus ferruginous pygmy-owl, **lesser long-nosed bat**, **jaguar**, and New Mexico ridgenose rattlesnake.

Analysis by Species: (Note: only includes species on Empire-Cienega Planning Area Allotments)

Huachuca Water Umbel

Proposed Mitigation Measures

To protect the Huachuca water umbel:

Note: Actions 1-4, 10-11 not applicable to planning area.

5. Existing AMPs for any allotments in Table 7 will be implemented no later than October 1998.
6. AMPs developed pursuant to item d. will be implemented no later than 2 years after completion.
7. Take action by October 1998 that will result in a ling-term upward trend in range condition (see footnote on p.43) in areas of "improve" allotments listed in Table 7 that are in fair or poor condition.
8. For allotments in the "custodial" category in Table 7, work with other landowners in the allotment to improve range condition (see footnote on p.43) in areas of fair or poor range condition. Actions the Bureau could take with others may include developing grazing strategies, planning and developing range improvement projects, and providing technical assistance.
9. Work with the Natural resource Service and landowners in the allotments to develop and implement watershed improvement projects that will increase infiltration.
12. Grazing on Bureau-administered lands in the allotments in Table 7 will adhere to the Bureau's Arizona Standards and Guidelines, Upland Livestock Utilization Standard, Safford Drought Policy, Arizona Ephemeral policy, and Riparian Area Policy.

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13. Inventory, monitoring, and evaluations as described in the Bureau's proposed action (Bureau 1996a) and applicable sections of the bureau manual, will be conducted in the allotments in Table 7. Inventory, monitoring, and evaluation activities and results; removal of trespass cattle; fence construction; and AMP development will be summarized in an annual report to the Service, due March 15 of the year following the calendar year in which such activities occurred. The first report will be due March 15, 1998.

Conservation Recommendations

(not applicable to planning area)

Gila Topminnow

Proposed Mitigation Measures

To protect the Gila topminnow and its habitat:

1. Maintain the exclosure around the Martin Well.
2. Cooperate with the Service and the Arizona Game and Fish to identify site-specific measures to protect populations of topminnow from grazing program impacts as specific impacts are identified. These measures could include, among others, survey of stock waters for nonnative fish, replacement of nonnative fish populations with native fish in perennial stock ponds, and implementation of prescribed fire in grassland vegetation types in the Cienega Creek watershed to improve the condition of the watershed.

Terms and Conditions

***Note: Action 1)* not applicable to planning area allotments.**

2) No action shall be taken that would result in increased grazing pressure at Cold Spring Seep, Nogales or Little Nogales springs, Cienega Creek on the ***Empirita allotment****, or Watson Wash.*

2.1 - Ensure that any changes in pasturing, season of use, stocking levels, construction or maintenance of range improvements , and other aspects of the grazing program do not result in an increase in cattle use at Cold Springs Seep prior to the fence construction, Nogales and Little Nogales springs, Cienega Creek on the Empirita allotment, or at Watson Wash. Measures to ensure that grazing pressure does not increase may include construction of exclosures to protect topminnow populations.

2.2 - Construct in 1997 a livestock enclosure around Cold Spring Seep (not TFO)

3) Action shall be taken to ensure that watershed effects to topminnow habitat on the ***Empirita,*** *Kimball Community, and Bryce allotments do not increase.*

3.1 - Ensure that long-term range condition does not deteriorate and remains in good or excellent condition on the Empirita, Kimball Community, and Bryce allotments.

3.2 - Grazing in the Empirita, Kimball Community, and Bryce allotments shall strictly adhere to the Bureau's Arizona Standards and Guidelines, the Upland Livestock Utilization Standard, Safford Drought Policy, Arizona Ephemeral Grazing Policy, and Riparian Area Policy.

4) Activities that may result in a take of topminnow or destruction of topminnow habitat shall be evaluated, monitored, and modified as needed to reduce potential adverse effects to the species.

4.1 - A mitigation plan shall be developed in coordination with the Service for each range improvement project that may adversely affect topminnow or its habitat, prescribed fire, and vegetation management project in the allotments listed in Table 12 (excluding projects in the Fan allotment and those addressed in previous consultations. Mitigation plans for prescribed fire shall limit to the extent practicable the possibility that fire would spread to riparian habitat at topminnow localities. Plans shall be approved by the Service.

4.2 - Evaluate all stock tanks on the allotments in Table 12 for their degree of risk to introduce nonnative fish to topminnow habitat. The Bureau will then, in conjunction with the Service and Arizona Game and Fish Department, develop and implement management techniques or practices for the tanks in each risk category. Management techniques may include, replacement of the existing tanks with alternative water sources, treatments to eliminate fish, or other appropriate methods. Proposed tanks will undergo the same evaluation for risk, and will include development of a mitigation plan approved by the Service.

4.3 - Inventory, monitoring, and evaluations as described in the Bureau's proposed action and applicable sections of the Bureau Manual shall be conducted in the Empirita, Kimball Community, and Bryce allotments.

5) Monitor incidental take resulting from the proposed action and report to the Service the findings of that monitoring.

5.1 - The Bureau shall submit annual monitoring reports to the Arizona Ecological Services Field Off by March 15 beginning in 1998. These reports shall briefly document for the previous calendar year the effectiveness of the terms and conditions, and documentation of take, if any. If such monitoring occurs, the report shall also summarize the condition of habitat at Gila topminnow localities, and fish monitoring data, including numbers of topminnow observed, presence of nonnative fish, etc. The report shall make recommendations for modifying or refining these terms and conditions to enhance topminnow protection or reduce needless hardship on the Bureau and its permittees.

Conservation Recommendations

1. Regularly monitor the Gila topminnow populations at the localities listed in Table 12 and report the results of such monitoring to this office.
2. Investigate water quality at Cold Spring Seep and take action to correct degraded water quality.
3. Implement prescribed fire on the Cienega Creek watershed to improve watershed condition.
4. Work with the Service and Arizona Game and Fish Department on planning for further introductions of topminnow into suitable habitat.
5. Coordinate with the Service and Arizona Game and Fish on recommendations of extant/extirpated status.

Southwestern Willow Flycatcher

Proposed Mitigation Measures

To protect the Southwestern willow flycatcher and its habitat:

Action Plan:

The bureau's Safford and Tucson Offices will develop and implement a plan for the flycatcher that provides for protection and management of flycatcher habitat while implementing Bureau authorized activities.

1) Mapping: Maps will be prepared that convey the following information about the flycatcher habitat managed by the Safford and Tucson Offices:

a. Location, size, shape, and spacing of habitat areas;
b. Habitat stage with respect to flycatchers according to the following classification: suitable-occupied, suitable-unoccupied, suitable-unsurveyed, potential in the short term (1-3 yrs), and potential in the long-term (>3 yrs)
c. Status of flycatcher surveys for each area of suitable habitat: either the date(s) surveyed or indication that the area has not been surveyed.

2) Flycatcher Surveys: A list will be prepared of areas to be surveyed following the most recent Service recommended protocol, along with the anticipated date.

3) Habitat Management Guidelines: Management guidelines (fencing, grazing system use, or habitat improvement activities) will be prepared and implemented for areas at each of the habitat stages defined above for the mapping. These guidelines must include:

a. Exclusion of livestock grazing within occupies or unsurveyed, suitable habitat during the breeding season (Apr 1-Sept.1)
b. Management of suitable habitat so that its suitable characteristics are not eliminated or degraded.
c. Management of potential habitat to allow natural regeneration into suitable habitat as rapidly as possible.

4) Cowbird Control: To reduce the likelihood of nest abandonment and the loss of flycatcher productivity owing to cowbird parasitism associated with the Bureau-administrated grazing activities in or near occupied habitats, the following will be implemented:

a. Investigate and identify livestock concentration areas on Bureau lands in the action areas that are likely foraging areas for the cowbirds with in a 5-mile radius of occupied or unsurveyed suitable flycatcher habitat (not including the Gila River corridor downstream of the San Jose Diversion in the project area), and evaluate ways to reduce any concentration areas found.
b. If cowbird concentrations indicate a strong likelihood that parasitism to flycatcher nests is occurring or actual parasitism is documented through nest monitoring, possible cowbird foraging areas will be assessed, and appropriate control measures for cowbirds will be implemented. Evaluation of possible parasitism apply to active flycatcher nests on Bureau-administrated lands which are within 5 miles of Bureau-authorized grazing activities (not including the Gila River corridor downstream of the San Jose Diversion in the project area). These efforts will be coordinate with the Service, APHIS, and Arizona Game and Fish. Monitoring and/or control activities will be conducted by qualified personnel with appropriate permits.

The number and acreage of suitable and potential habitat areas may change due to natural riparian restoration processes, site potential, flood events which alter riparian vegetation and site capability, refinements in

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habitat definitions, and additional inventory/mapping efforts. Keep the Service apprized of these sorts of changes on a regular basis.

Direction on this issue (grazing use in occupied or suitable-unsurveyed habitats during the nesting season) will be fully implemented prior to the 1998 flycatcher nesting season. A schedule for completion of the above features will be developed and transmitted to the Service with 60 days of the date of this BO. The Service will respond within 30 days thereafter with comments on the adequacy of the schedule for meeting the intent of the reasonable and prudent alternative.

Terms and Conditions

1) Actions shall be taken to ensure effects of grazing in riparian habitats, with subsequent direct effects to the flycatcher, are minimized.

1.1 - Take immediate action to remove trespass cattle from the San Pedro River RNCA as soon as possible, and measures shall be implemented, including continuing to construct, inspect, and maintain fences, and working diligently with adjacent landowners, to ensure that trespass does not continue.

1.2 - Work with private landowners in the Brunchow Hill allotment to exclude livestock from Bureau-administrated lands in that allotment within the RNCA.

1.3 - AMP's shall be completed within 3 yrs. (or according to a schedule approved by the Service) for any allotments in the improve category listed in table 7 that currently do not have them.

1.4 - Existing AMPs for any allotments in Table 7 shall be implemented no later than October 1998.

1.5 - AMPs developed pursuant to item c. shall be implemented no later than 2 years after completion.

1.6 - Take action by Oct. 1998 that will result in a long-term upward trend in range condition in the "improve" allotments in Table 7.

1.7 - For allotments in the "custodial" category in Table 7, the Bureau will work with the landowners in the allotment to improve range condition in areas of fair or poor range condition. Actions the Bureau could take with others may include developing grazing strategies, planning and developing range improvements projects and vegetation management, and providing technical assistance.

1.8 - Work with Natural Resource Conservation Service and landowners in the allotments to develop and implement watershed improvement projects that will increase infiltration.

1.9 - Do not develop or maintain range improvement projects in the riparian corridor of the San Pedro River, except for fences, cattle guards, and gates to exclude and better manage cattle. Also, do not conduct chemical or mechanical vegetation management or prescribed fire in the riparian zone of the San Pedro or Babocomari rivers for the purpose of managing livestock.

1.10 - Construction, maintenance, or management activities in the riparian zone of suitable or occupied habitat shall occur outside the flycatcher breeding season

1.11 - Construction, maintenance, or management activities in the riparian zone of suitable or occupied habitat shall be planned to avoid removing willows and cottonwoods.

1.12 - Fence maintenance of exclosures, riparian pastures, or boundary fences, and sweeps of occupied or unsurveyed suitable habitat on allotments identified in Table 17 to push out cattle, will be conducted before each flycatcher breeding season.

2) Actions shall be taken to ensure that effects of grazing activities in the watersheds of flycatcher habitat that may result in direct effects to flycatchers, are minimized.

2.1 - A mitigation plan shall be developed in coordination with the Service for each range improvement project and vegetation management project that may adversely affect the flycatcher, and for each prescribed fire in the allotments in Table 17. Mitigation plans for prescribed fire shall limit to the extent practicable the possibility that fire would spread to riparian habitat in the allotments. Mitigation plans shall be approved by the Service.

2.2 - Grazing on the Bureau-administered land allotments in Tables 6 and 16 shall strictly adhere to the Bureau's Arizona Standards and Guidelines, the Upland Livestock Utilization Standard, Safford Drought Policy, Arizona Ephemeral Grazing Policy, and Riparian Area Policy.

3) Where grazing activities may be facilitating brood parasitism, take action to minimize effects to the flycatcher.

3.1 - New livestock management facilities that are likely to attract and support cowbirds must be located beyond 5 miles of occupied, suitable, or potential flycatcher habitat unless such facilities are: (1) located within 5 miles of suitable or occupied habitat on the Gila River downstream of the San Jose Diversion, or (2)crucial to protection of the riparian habitat, and (3)cowbird trapping is implemented to counteract the effect of the facility.

4) Monitor incidental take resulting from the proposed action and report to the Service the findings of that monitoring.

4.1- Submit annual monitoring reports to the Arizona Ecological Services Field Office by March 15 of each year beginning in 1998. These reports shall briefly summarize for the previous year: (1) effectiveness of these terms and conditions, and(2) documentation of take, if any. If such activities or monitoring occur, the report shall also summarize: (1) inventory, monitoring, and evaluations as described in the Bureau's proposed action (Bureau 1996a) and applicable sections of the Bureau Manual for the allotments in Tables 6 and 16; (2) results of re-assessment of riparian functioning condition conducted every 5 years to assess achievement of habitat improvement; (3) grazing actions initiated or completed, including range improvement projects, prescribed fire, and vegetation management in the allotments in tables 6 and 16; and (4) records of downed or damaged riparian exclosure fences and action taken to remove trespass cattle. The report shall also make recommendations for modifying or refining these terms and conditions to enhance protection of the flycatcher and to reduce needless hardship on the Bureau and its permittees.

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Lesser Long-nosed Bat

Terms and Conditions

1) Ensure that the grazing program does not facilitate public access to bat roosts.

1.1- Ensure that construction, upgrading, or maintenance of roads associated with the grazing program does not increase or facilitate public access to known day roosts of the bat.

2) Defined project areas and well-defined operational procedures shall be implemented to reduce adverse effects to bat forage plants due to construction of range improvement projects, chemical or mechanical vegetation management, seeding/planting of nonnative plants, or prescribed fire.

2.1 - Prior to construction of range improvement projects, pre-construction surveys shall be conducted for paniculate agaves and saguaros that may be directly affected by construction activities, or in the case of new water sources, may occur within 0.5 mi of the proposed water source. If agaves or saguaros are found during pre-construction surveys, the following measures shall be implemented:

a. Fences, pipeline, waters, and other range improvement projects shall be located to reduce as much as possible injury and mortality of agaves and saguaros.
b. Disturbance shall be limited to the smallest area practicable and projects shall be located in previously-disturbed areas whenever possible.
c. Vehicle use shall be limited to existing routes and areas of disturbance except as necessary to access or define boundaries for new areas of construction or operation.
d. All workers shall strictly limit their activities and vehicles to designated areas. Construction workers shall be informed of these terms and conditions.

2.2 - No seeding/planting of nonnative plants shall occur on any allotments in which paniculate agaves or saguaros occur.

2.3 - Chemical and mechanical vegetation manipulation and prescribed fire shall be designed and planned to minimize adverse effects to long-nosed bat forage plants. Measures shall be developed to ensure that no more than 20% of agaves that are burned during prescribed fire are killed by the fire and that injury and mortality of saguaros are negligible.

2.4 - A mitigation plan shall be developed by the Bureau in coordination with the Service for the prescribed fire or chemical or mechanical vegetation management project within 0.5 mi of the bat roost or in the areas that support paniculate agaves or saguaros. The mitigation plan shall ensure that effects to bat roosts and forage plants are minimized and shall include monitoring of effects to forage plants. The plan shall be approved by the Service.

3) Support surveys for bats to facilitate better management of bats and their habitat.

3.1- Support surveys for long-nosed bat in the project area. Survey results shall be shared with the Service and used to make management decisions consistent with these terms and conditions.

4) Graze allotments in a manner so as to protect and enhance the forage base of the long-nosed bat.

4.1- Grazing in allotments supporting paniculate agaves or saguaros shall strictly adhere to the Bureau's Arizona Standards and Guidelines, the Upland Livestock Utilization Policy, Safford Drought Policy, and the Arizona Ephemeral Grazing Policy.

5) Monitor incidental take resulting from the proposed action and report to the Service the findings of the monitoring.

5.1- Submit annual monitoring reports to the Arizona Ecological Services Field Office by March 15, 1998. These reports will document the effectiveness of these terms and conditions, and documentation of take (if any). If such activities or monitoring occur, the report shall summarize: (1) grazing actions initiated or completed including range improvement projects, prescribed fores, and vegetation management; (2) monitoring results of prescribed fires; (3) allotment inventory, monitoring, and evaluation results; and (4) long-nosed bats detected. Make recommendations for modifying or refining these terms and conditions to enhance bat protection or reduce needless hardship to the Bureau and its permittees.

Conservation Recommendations

1. In coordination with the Service and the Game and Fish, investigate the effects of the grazing program on the bat and its habitat, including clarifying the distribution of the bat and forage plants on allotments, and quantifying the direct and indirect effects of livestock grazing, development of range improvement projects, and other aspects of the grazing program.
2. Service requests notification of implementation of any conservation actions.

Jaguar

Proposed Mitigation Measures

To protect the Jaguar and its habitat:

1. Inform permittees by the letter within 90 days of the date of this opinion that the jaguar is listed as endangered under the Act, take of jaguar is prohibited under the Act, and violators are subject to prosecution and substantial fines.
2. Require that all appropriate State permits are obtained prior to authorizing any control activities.
3. Dense, low vegetation in major riparian corridors within allotments on Bureau-administered lands south of I-10 and Highway 86 will be maintained.

Terms and Conditions

1) Jaguars will not be subjected to any predator control activities, by any entity, associated with the project.

1.1 - Predator control activities associated with livestock grazing and authorized by the Bureau shall require identification of the target animal to species before control activities are carried out. If the identified animal is a jaguar, that individual shall not be subjected to any predator control actions. If, when using dogs to tree mountain lions, a jaguar is inadvertently chased and/or treed by the dogs, the dogs shall be called off immediately once it is realized the animal is a jaguar.

2) Permittees will be informed by the Bureau of the status of the jaguar and the specifics of its protection under the Act.

2.1 - Permittees shall be informed by the Bureau by letter within 30 days of receipt of this BO that take of jaguar, including harm and harassment, is prohibited under the Act and could result in prosecution.

3) All appropriate permits will be obtained prior to any predator control activities associated with the project.

3.1 - Any predator control activities authorized by the Bureau and associated with this project shall be conducted only after all appropriate permits have been obtained.

4) Jaguar habitat will be maintained in identified locations.

4.1 - Dense, low vegetation in major riparian or xero-riparian corridors on Bureau-administrated lands south of Interstate 10 and Highway 86 shall be maintained.

5) Investigate reports of any and all observations of jaguars or their sign in the project area and will provide the Service with a report of such investigations.

5.1- In coordination with the Service and Arizona Game and Fish, we shall investigate all reports that it receives of observations of jaguars in the project area. The investigation shall include appropriate field collection of data. The Bureau is encouraged to enlist the expertise of the AZ Game and Fish. The Bureau shall provide a detailed report of each observation and investigation to the Arizona Ecological Services Office within 30 days of the occurrence of each incident. Such information shall also be included in the annual monitoring report to be submitted by March 15, 1998.

Conservation Recommendations

1. The service recommends that the Bureau fund and/or carry out research to (a) determine the distribution of jaguar habitat within the project area, (b)determine the possible or actual distribution of jaguars within that habitat, and (c) determine means by which that habitat can be maintained and protected.
2. Service requests notification of implementation of any conservation actions.

8. SUMMARY OF EMPIRE-CIENEGA INTERIM GRAZING PLAN

I. INTRODUCTION

The interim livestock grazing management plan has been prepared to guide the management and administration of the ongoing livestock grazing operation on the Empire-Cienega Resource Conservation Area pending the development of the comprehensive land use plan scheduled for 1995. The interim grazing plan identifies the resource objectives, prescribes the manner in which the livestock grazing operation will be conducted to sustain the resources, identifies needed range improvements, provides the monitoring plan to measure the effectiveness of management actions, and details the procedures for the evaluation and modification of the livestock grazing use.

The Empire and Cienega ranches are located just north of the town of Sonoita, between the Whetstone and Santa Rita Mountains, 52 miles southeast of Tucson. The ranches are within Pima and Santa Cruz Counties, Arizona. Elevations average 4,600 feet. The ranches include 36,498 acres of recently acquired public land and 37,462 acres of state owned land.

The Empire and Cienega ranches are within the Santa Cruz River drainage. The broad alluvial Cienega Valley is dissected by Cienega Creek which drains portions of the Santa Rita Mountains to the west, the Canelo Hills to the south, and the Whetstone Mountains to the east. Cienega Creek flows north 20 miles to its confluence with Pantano Wash, which flows through the city of Tucson.

II. OBJECTIVES

A. Upland Vegetation

1. Limit the average utilization to 40 - 60% of current years growth on "key" perennial grass species, and assure the physiological requirements of plant growth, rest, and reproduction are met for "key" species.

2. Monitor Range Condition, Trend, and Utilization at 21 study sites:

B. Riparian Vegetation

1. Maintain or restore an advanced ecological status and proper functioning condition on riparian areas, thus providing the widest variety of vegetation and habitat diversity for wildlife, fish, and watershed protection. This will include constructing fencing and upland water developments necessary to create riparian pastures along the perennial portions of Cienega Creek to provide adequate rest from livestock grazing.

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A summary of the perennial stream reaches in the allotment:

Cienega Creek	10.4 Miles
Lower Mattie Canyon	1.25 Miles
Empire Gulch	1.50 Miles

2. Monitor riparian condition and function at 13 sites.

3. Wildlife

1. Improve habitat for antelope, mule deer, white tail deer, and other wildlife species by providing adequate food resources, water cover, and space, with the primary emphasis on antelope habitat. These efforts will include but not be limited to maintaining forage reserves, cooperatively developing wildlife waters, and providing periodic rest to portions of the range.

2. Specific objectives for individual species are pending development of the Land Use Plan Amendment.

3. Provide for the protection and recovery of habitats necessary to support healthy viable populations of the following special status species:

   Gila Topminnow, Gila chub, longfin dace
   Lowland Leopard Frog
   Mexican Garter Snake
   Southwestern Willow Flycatcher
   Lesser Long-nosed Bat

4. Through analysis of the Upland and Riparian vegetation monitoring programs, and the Fisheries, Wiildlife, and Aquatic monitoring programs; evaluate the effects of the livestock grazing on wildlife populations.

D. Watershed

1. Reduce erosion and stabilize the watershed by increasing the overall vegetative ground cover.

2. Measure groundcover at all the proposed upland vegetative monitoring sites.

III. CURRENT AUTHORIZATIONS

The Bureau of Land Management currently leases the federal lands in the Empire-Cienega RCA to John and Mac Donaldson for livestock grazing. The BLM also subleases the State of Arizona livestock grazing leases (05-1597 and 05-1623) to the Donaldsons. The summary of acreage and grazing capacity by ownership is as follows:

Grazing Lease	Acreage	Animal Units
BLM No. 6090	36,538.31.00	704
STATE No. 1597	15,314.40	382
STATE No. 1623	22,147.29	414
TOTAL	**74,000**	**1500**

The initial authorized use on the Empire-Cienega Ranch allotment will be 1500 cattle yearlong. Continued data gathering and analysis will be necessary to determine whether this projection is accurate. Utilization figures, along with an analysis of actual use, climate, and range trend data will be used to determine if a change in livestock numbers is needed.

Due to the annual variability in forage production and plant growth resulting from fluctuations in moisture and temperature regimes, it may become necessary to disperse livestock or change from the planned rotation. Under extreme circumstances reduction of livestock numbers or removal of cattle from the allotment may be appropriate.

IV. LIVESTOCK AND HERD MANAGEMENT CONCEPTS

The Donaldson's management philosophy for livestock grazing on the Empire-Cienega is based on one herd of mother cows, moving through a series of flexible pasture rotations as the seasons progress. The ranch is divided into "units of usability," which are variable size units of rangeland that will support the base herd for a certain period of time during a certain time of the year. The units are tied to "primary" water sources.

Under the one-herd concept, all mature female cattle are run together, and all replacement females are bought at breeding age so they can enter into this herd as soon as possible. Bulls are put with the cows in mid-summer and pulled off in the fall. One herd is used to maximize rest in all other nongrazed units, and to better utilize the different species of grasses. Multiple selection of species is possible, and regrazing of species is kept to a minimum. The husbandry of the cattle becomes more efficient due to their concentration.

The rangeland on the planning area can be divided into fairly distinct units of variable size that can support the base herd of cattle for a specified period of time during the grazing rotation.

Units are classified as either

1. Summer Use - Growing Season Use Units
    - A. Sacaton
    - B. Upland Plains
2. Winter Use - Dormant - Non-Growing Season Use Units
    - A. Empire Mountains
    - B. Whetstone Mountains

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3. Combination (Growing and/or Non-Growing Season Use)
4. Supplemental Use Units
    A. Horse Pastures
    B. Shipping Pastures
    C. Riparian Pastures

Rangeland Pasture Units

The units of usability are evaluated for their suitability for livestock use during the upcoming pasture rotations (forage quality and availability, water, fencing, ect). A proposed rotation strategy is developed for the animals' physiological needs and the vegetation condition. The proposed rotation is charted on graphs. The proposed livestock actions are then presented to the Biological Planning Team for review.

Once the biological planning has been completed and the upcoming grazing rotations tentatively scheduled, the livestock graze the particular unit of usability selected until monitoring of forage utilization and animal performance show the need to proceed to the next unit in the rotation. Desired levels of utilization may vary depending on the "key" forage species selected, wildlife objectives or concerns, plant phenology, time of the year, current condition of the unit, and intensity of past grazing of the unit.

Holding a biological planning meeting in September or October each year to discuss adjustments to livestock numbers based on forage produced in the summer units following the summer monsoon season is critical to livestock management. Decisions on adjusting the herd size need to be made before shipping in October and November when the cattle are in the shipping pasture complex of the ranch.

Riparian Pasture Units

Riparian pasture units are mainly important as watering points for cattle and as lanes to allow cattle to cross from east pasture units to west pasture units. Riparian pasture units would provide only limited grazing for a short time by the main herd. These units could be grazed by a portion of the herd for specified periods to achieve resource objectives such as to reduce fuel loads for fire prevention or to open up marsh areas as open water habitat for waterfowl.

Once the northern riparian pastures are realigned, livestock use of the riparian pastures along Cienega Creek would be restricted to use of the northern 1.5 miles of the creek near the Narrows. The designated crossing lanes would be used as needed to rotate cattle to pastures unless resource objectives are to be achieved and these objectives have been consulted and agreed upon.

Develop range improvements as needed to achieve the resource objectives.

Northern Riparian Pasture Realignment

The highest priority is to complete the riparian pasture development, and realignment of existing fences at the north end of the Mac's sacaton pasture to the Narrows along Cienega Creek. This work would eliminate the need for the Fresno and Dominguez watering points and allow livestock to be excluded from Cienega Creek, except at the very north end at the Narrows, where alternative water sources cannot be easily developed. The fencing would also create additional sacaton pastures adjacent to the riparian pastures of Cienega Creek. This would create opportunities for more intensive pasture management. Cattle could be held longer in sacaton pastures in spring and fall, increasing the amount of rest on the upland summer range.

Table 1. Riparian Crossing Lanes on Cienega Creek

Lane	Pasture	TWP	RNG	Section
New Road Crossing	North/Mac's Sacaton	18 S	17 E	34
New Jesse Lane	North/Lower 49/ Mac's Sacaton	18 S	17 E	26
New Fresno Gap Lane	Lower 49/ Rockhouse/Lower Mattie Sacaton	18S	17	23
New Dominguez Lane	Rockhouse/Fresno	18S	17	13
Narrows Lane	Rockhouse/Apache	18S	18	7
Lower 49 Gaps (Existing)	Lower 49/Mac's Sacaton	18 S	17 E	2

Table 2. Summary of Proposed Fencing

Project Name	Pasture	Township	Range	Section	Units
Spring Water Sacaton Fence	E 500 Acre & 5 Wire & Mac's	19 S 18 S	17 E 17 E	2, 11 34.35	2 mi. 1 mi.
Lower 49 Sacaton Fence	Lower 49/ 500 Acre, 5 Wire	18 S	17 E	26 NW, 27 NE	2 mi.
Lower Mattie Sacaton Fence	L. Mattie/Fresno	18 S	17 E	13, 23, 24, 25, 26	4 mi.
Rockhouse Riparian Fence	Rockhouse/Apache	18 S 18 S	18 E 17 E	6, 7. 12, 13	2 mi.
Narrows Riparian Fence	Empirita	18 S	18 E	6	1 mi.

Table 3. Empire-Cienega Ranch Water Developments

Project Name	Township	Range	Section	Units
Lower 49 Well Drill Equip and Tank and Fence	18 S	17 E	27232627	1 well and tank 1.5 mi fence
Enzenburg North Well and/or Sam's Well Project	18 S	17 E	34 NW	1

Upland Plains Units Developments

The following proposed range improvements would enhance current management by giving more management options and facilitating control and movement of livestock. These improvements are not essential but would be considered when funding becomes available.

Project Name	**Township**	**Range**	**Section**	**Units**
Mud Springs Well Drill, Equip., and Tank	19 S	18 E	29 NE	1 each
Upper 49 Well Redrill, Equip, and Tank or Reservoir Construction	18 S	17 E	26 NW	1 each
Upper Road Canyon Well Drill, Equip, Tank and Fence	19 S	17 E	16 NE 26,27,35,36	1 well 2 tanks 3 mi fence
Upper Apache Div. Fence	18 S	18 E	222734	3 mi fence
Test Hole Wing Fence	18 S	18 E	2833	1 mi fence
Hilton Pasture Fence	Not Determined			
Road Canyon Div. Fence	Not Determined			

9. INTEGRATED VEGETATION TREATMENT PROGRAM

VEGETATION TREATMENT METHODS

Along with other land management practices, the following vegetation management techniques will be used separately or in combinations to direct desired changes:

A. PRESCRIBED BURNING AND FIRE MANAGEMENT

Fire is a natural process within the grassland-savannah ecological sites. The goal of the Empire-Cienega Planning Area prescribed burning program is to simulate this process in maintaining grassland communities. To meet upland vegetation objectives, fire will be used as a tool to promote vegetation change through decreased shrub cover and increased cover by mid-to-tall-stature perennial grasses.

Prescribed burning is the planned application of fire to rangeland vegetation and fuels under specified conditions of fuels, weather, and other variables to allow the fire to remain in a predetermined area to achieve site-specific objectives. Management objectives include controlling certain plant species; enhancing growth, reproduction, or vigor of plant species; managing fuel loads, and managing vegetation community types. Prescriptions will be developed for each prescribed fire within the planning area. The area is too small to manage unplanned ignitions, so wildland fires will continue to be responded to as described in Chapter 2.

Action: Implement a prescribed fire program for the ecological sites (Sandy Loam Upland, Loamy Upland, and Limy Slopes) within the Empire-Cienega Ranch according to the following:

Prescriptions:
The 20,000 acres proposed for treatment above occur on three primary ecological sites:
Sandy Loam Upland, Loamy Upland, and Limy Slopes. Prescriptions will vary by ecological site and condition.

Forecast Narrative:
Site specific burn plans will be developed for each planned unit within a project area. The plan is based on the resource objectives in the environmental analysis for that project. Prescriptions are developed that will achieve resource objectives, allow for firefighter and public safety, and achieve the objectives in the burn permit (smoke management). Temperatures, relative humidity, wind speed and direction, and fuel moistures will be monitored prior to, and during, prescribed fire implementation. A spot weather forecast will be obtained from the National Weather Service prior to ignition. If the forecast is not favorable the burn will be postponed.

Unit Boundaries and Special Considerations:
Many prescribed fire units include "allowable areas" which are used for fire control purposes. Adjacent allowable areas are analyzed for effects, as part of the unit. Prescribed fire units may be delineated within broader treatment areas. Treatment areas are shown on Map X. Treatment areas may include more than one ecological site. Treatments may include the use of management actions other than, or in combination with, the use of fire.

Unit rotation will be based on minimum fire frequency and drought. If wildland fires occur, the acreage lost to them will be considered in determining the amount of area to be treated with prescribed fire for the year. Rotation of burn units and carefully planned sequencing will distribute short-term impacts throughout the watershed.

Each fire unit will have an operational site-specific burn plan and a smoke permit in place before being ignited. These plans will include special considerations to protect the following:

- riparian areas
- fish habitat
- cultural resources
- habitat of sensitive wildlife species

Precautions will be taken to ensure the safety of structures and other property. As much as possible, natural features and existing roads will be used to confine the fire. Needed fire control lines will be constructed.

To ensure protection of cultural resources, all prescribed burn areas will be inventoried for archaeological properties, historic structures, and traditional use plants. Areas surrounding such cultural properties will be pretreated to prevent destruction during a prescribed burn. These requirements are specified by BLM Instruction Memorandum AZ-90-52, Requirements for Cultural Resource Inventory of Prescribed Burn Areas.

Units will need to rested from grazing after burning (a minimum of two seasons) to enhance the establishment of new perennial grasses and increase the vigor of perennial grasses present before burning. Rest will also allow litter to accumulate and serve as a mulch and ground cover to protect the soil and enhance the seedbed. Once the desired plant communities have been attained, livestock grazing will resume in the unit.

Sediment control will be applied to burn units following BLM national guidelines and requirements and will also consider Best Management Practices prescribed by Arizona Department of Environmental Quality. Pre-burn and post-burn treatments will be evaluated in the operational burn plan for each unit or block of units. Treatments may include seeding, building physical structures, and mechanical and biological treatments. Any areas to be seeded will be seeded with native species or annual species that are not at risk of establishing on the treatment sites. Units that include Lehmann's lovegrass will be evaluated closely before burning since Lehmann's has been shown to spread as a result of fire.

Unit Size:

Desired annual burned acreage in this area for this fuel type is less than 2,500 acres under fire intensity level 1-2 and less than 300 acres under intensity level 3.

Limit fire size in the broadleaf riparian areas to less than 300 acres per year under intensity level 1-2 and less than 50 acres per year under intensity level 3.

Strive to treat 2,000 acres annually with prescribed fire to create a mosaic pattern in semidesert grasslands and to reduce the increasing and invading brushy species while increasing perennial grasses. Pursue a fuels hazard reduction strategy to reduce the intensity and size of wildfire, should one occur.

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Ignition:
Prescribed fires used to improve upland condition will be ignited by hand or aircraft. Helicopters may be used to ignite larger or more complex units.

Agreement:
The use of fire as a tool has some inherent risk. Therefore, it is prudent to have a formal agreement with adjacent land owners that allows for and provides for protection of property. Agreements that address the use of fire on the Empire-Cienega Planning Area and that may affect other lands will be pursued with the State of Arizona, U.S. Forest Service, adjacent private land owners, and the local Natural Resource Conservation District (NRCD), and Sonoita-Elgin Volunteer Fire Department. This agreement should be a proactive, multi-year fire agreement with annual review. BLM will encourage the opportunity for cooperative efforts to restore grassland vegetation components using fire on other lands in the watershed.

Relationship to Other Plans and Guidance:
Treatments would be implemented according to the BLM Prescribed Fire Management Handbook (H-9214-1) and BLM Safford/Tucson Zone Fire Management Plan (1997).

Application of the BLM Safford/Tucson Zone Fire Management Plan (1997):
Because of constant variation in a multitude of factors such as climate; fuels; fire fighting resources available; and risks to life, property and natural resources, this plan is only a guide. The professional judgment of the incident commander, based upon the best information available at the time, will guide the implementing of this plan. Prescribed fire efforts will be curtailed if the target burned acreages are reached through unplanned ignitions.

Constraints common to all the polygons include limiting surface disturbance and fire spread where cultural sites, special status species, or both exist. Fire management staff will meet periodically with program specialists to heighten their awareness of sensitive resources and locations. A practical means to minimize disturbance of sensitive resources will be sought and refined.

Calculation of burned acreages for this plan will include all reported burned acreages by vegetation type or polygon, regardless of ownership. Resource impact is best measured by total acres burned without regard to jurisdictional boundaries. BLM will apply this plan to lands under its jurisdiction and coordinate with and support adjacent jurisdictions. BLM will use the expertise and help of other agencies and entities to achieve multiple use goals through fire.

Recommended actions across all polygons include the following:
- Reducing dangerous fuel buildups near structures.
- Educating the public about wildfire prevention by signing campsites and major roadways or by other forms of outreach
- Continuing to seek increased efficiencies through interagency agreements or other forms of cooperation.

Reaching target burned acreage goals will depend on many factors, including the following:
- Completion and approval of required plans.
- Suitability of weather and resource conditions.
- Availability of financial and personnel resources.

B. CHEMICAL TREATMENTS

Treatments would be conducted according to BLM procedures. The chemicals can be applied by many methods, and the selected technique depends on a number of variables, including the following:

- Treatment objective.
- Physical characteristics of the site, including accessibility and size of the treatment area.
- Characteristics of the target species and the desired vegetation.
- Proximity to sensitive areas.
- Anticipated costs and equipment limitations.
- Water and vegetation condition in the treatment area during the treatment.

Herbicide applications will be scheduled and designed to minimize potential impacts on nonmarket plants and animals. The rates of application will depend on the following:

- Target species.
- Presence of nonmarket vegetation.
- Soil type.
- Depth to water table.
- Presence of other water sources.
    - Label requirements.

The chemicals would be applied aerially or on the ground using vehicles or manual application equipment.

C. MANUAL TREATMENTS

Manual methods of noxious plant control may be practical for the following purposes:

- Clearing scattered plants invading grasslands.
- Cleaning up following other control methods.
- Maintaining treated areas against reinvasion.
- Removing small stands of non-native or poisonous plants before they can spread further.

Simple hand tools such as saws, axes, shovels, and picks are easy to obtain, operate, and repair, but labor costs are high per acre. Workers can also use power tools such as chain saws. In manual treatments workers would cut plants above ground level. Although the manual method of vegetation treatment is labor intensive, it can be extremely species sensitive and can be used around more sensitive habitats and in areas inaccessible to ground vehicles.

D. MECHANICAL TREATMENTS

BLM will also use mechanical methods where practical to control undesirable plants. Choosing the best mechanical method will depend upon several factors:

- Characteristics of the target plant species (density, size of stem, brittleness, and sprouting ability).
- Need for seedbed preparation and revegetation of the treated area.
- Topography and terrain of the treatment area.

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- Kind of soil (depth, amount of rock, erosiveness, and degree of compaction).
- Site potential. (The cost of improvement should be consistent with expected productivity.)

Some possible methods include bulldozing, root cutting, plowing, disking, chaining, brush cutting and crushing, mowing, contouring, seedbed preparation, and planting.

E. BIOLOGICAL TREATMENTS

Biological methods of vegetation treatment employ living organisms to selectively suppress, inhibit, or control herbaceous and woody vegetation. Methods include selective grazing by livestock such as goats, sheep, or cattle.

10. EMPIRE-CIENEGA WEED MANAGEMENT AREA

Within the Empire-Cienega Weed Management Area, noxious weeds are addressed through the vegetation management priorities as listed in the Record of Decision for Vegetation Treatment on BLM Lands (USDI 1991):

> Priority 1: Act to prevent or minimize the need for vegetation control when feasible, considering management objectives for the site.
>
> Priority 2: Use effective nonchemical methods of vegetation control when feasible.
>
> Priority 3: Use herbicides after considering the effectiveness of all potential methods or in combination with other methods or controls. Weed infestations are best prevented by ensuring that the seed or vegetative reproductive plant parts of new weed species are not introduced into a new area. Vegetation management methods will be addressed by site-specific actions.

References:

"Partners Against Weeds" - An Action Plan for the Bureau of Land Management, January 1996, USDI-BLM

Guidelines for Coordinated Management of Noxious Weeds in the Greater Yellowstone Area

11. FACILITY INVENTORY MAINTENANCE MANAGEMENT SYSTEM (FIMMS)

A. MAINTENANCE LEVELS - ROADS

BLM Road Maintenance Levels - The assigned maintenance level reflects the appropriate maintenance that best fits the Transportation Management Objectives for planned management activities. Roads will be prioritized for maintenance needs or may be maintained at lower levels depending upon funding.

Level 1 - This level is assigned to roads where minimum maintenance is required to protect adjacent lands and resource values. These roads are no longer needed and are closed to traffic. the objective is to remove these roads from the transportation system.

> (Minimum standards for Level 1) - Emphasis is given to maintaining drainage and runoff patterns as needed to protect adjacent lands. Grading, brushing, or slide removal is not performed unless roadbed drainage is being adversely affected, causing erosion. Closure and traffic restrictive devices are maintained.

Level 2 - This level is assigned to roads where the management objectives require the road to be opened for limited administrative traffic. Typically, these roads are passable by high clearance vehicles.

> (Minimum standards for Level 2) - Drainage structures are to be inspected within a 3-year period and maintained as needed. Grading is conducted as necessary to correct drainage problems. Brushing is conducted ass needed to allow administrative access. Slides may be left in place provided they do not adversely affect drainage.

Level 3 - This level is assigned to roads where management objectives require the road to be open seasonally or year-round for commercial, recreation, or high volume administrative access. Typically, these roads are natural or aggregate surfaced, but may include low use bituminous surfaced roads. These roads have defined cross section with drainage structures (e.g., rolling dips, culverts, or ditches). These roads may be negotiated by passenger cars traveling at prudent speeds. User comfort and convenience are not considered a high priority.

> (Minimum standards for Level 3) - Drainage structures are to be inspected at least annually and maintained as needed. Grading is conducted to provide a reasonable level of riding comfort at prudent speeds for the road conditions. Brushing is conducted as needed to improve sight distance. Slides adversely affecting drainage would receive high priority for removal, otherwise they will be removed on a scheduled basis.

Level 4 - This level is assigned to roads where management objectives require the road to be open all year (except may be closed or have limited access due to snow conditions) and to connect major adminsitrative features (recreation sites, local road systems, administrative sites, etc.) to County, State, or Federal roads. Typically, these roads are single or double lane, aggregate, or bituminous surface, with a higher volume of commercial and recreational traffic than administrative traffic.

(Minimum standards for Level 4) - The entire roadway is maintained at least annually, although a preventative maintenance program may be established. Problems are repaired as discovered.

Level 5 - This level is assigned to roads where management objectives require the road to be open all year and are the highest traffic volume roads of the transportation system.

(Minimum standards for Level 5) - The entire roadway is maintained at least annually and a preventative maintenance program is established. Problems are repaired as discovered. These roads may be closed or have limited access due to snow conditions.

B. MAINTENANCE LEVELS - RECREATION SITES

Level 1 - Sites no longer meeting BLM objectives or no longer needed. Begin process to transfer site to another government entity or removing improvements and returning the site to its natural state. Dependent upon specific management transfer to undeveloped natural condition removes site from real property records as soon as possible. Any unused site.

(Minimum standards for Level 1) - No maintenance to be performed. No additional condition survey is required.

Level 2 - Sites included in this level include all undeveloped sites which receive repeated visitor use during all or parts of the year or on a seasonal basis.

(Minimum standards for Level 2) - Maintain to assure health and safety standards are met. Assure protection of the Government investment. Sites maintained on the average, once per year. Condition surveys are completed during time of maintenance.

Level 3 - This level includes sites where some minimum level of recreation facility development of physical resource protection (bank stabilization, gravel surfacing, etc.) Has been established.

(Minimum standards for Level 3) - Maintain to assure health and safety standards are met. Assure protection of the Government investment. Sites maintained to assure fair condition/appearance. Sites maintained on the average, twice a month. All critical repairs made within 10 working days, non-critical repairs made within 20 working days.

Level 4 - This level includes all sites which met less than five of the nine Land and Water Conservation Fund Act requirements for fee collection. Therefore, fees are not charged at these sites.

(Minimum standards for Level 4) - Maintain to assure health and safety standards are met. Assure protection of the Government investment. Sites maintained to assure fair condition/appearance. Sites maintained on the average, once a week during the use season. All systems/services are operational at the start of the use season, and upon failure, repairs are made within two working days. All non-critical repairs made within 10 working days of discovery. Sites maintained to assure fair to good condition/appearance.

Level 5 - Sites that meet five or more of the nine Land and Water Conservation fund Act requirements for fee collections listed below, including both overnight and day use facilities, and fees are collected.

(Minimum standards for Level 5) - Maintain to assure health and safety standards are met. Assure protection of the Government investment. Sites maintained to assure fair condition/appearance. Sites maintained on the average, once a week during the use season. All systems/services are operational at the start of the use season, and upon failure, repairs are made immediately. Repairs to non-critical items completed within two working days of discovery. Sites maintained to assure fair to good condition/appearance.

Land and Water Conservation Fund Act criteria for fee sites:

1. Tent or trailer sites.
2. Picnic tables.
3. Drinking water.
4. Access roads.
5. Refuse containers.
6. Toilet facilities.
7. Personnel collection of the fee by an employee or agent of the federal agency is operating the facility.
8. Reasonable visitor protection.
9. Simple containers for containing a fire (in areas where fires are permitted).

C. MAINTENANCE LEVEL - TRAILS

The assigned maintenance level reflects the appropriate level of maintenance required to meet management objectives.

Level 1 -These trails are closed to motorized and non-motorized use. This level is the minimum maintenance required to protect adjacent lands and resource values. The objectives may be to remove these trails from the trail system.

(Minimum standards for Level 1) - Emphasis is given to maintaining drainage and runoff patterns as needed to protect adjacent lands. Brushing and removal of hazards is not performed unless trail drainage is being adversely affected, causing erosion. Closure devices are maintained.

Level 2 -Low use trail with little or no contact between parties. Little or no visitor use management. Visitors may encounter obstructions like brush and deadfall.

(Minimum standards for Level 2) - Trail would require condition surveys once every year. Repairs will be done at the beginning of the season to prevent environmental damage and maintain access. Emphasis is given to maintaining drainage and mitigating hazards. The trail may be signed Not regularly Maintained. Major repair may not be done for several seasons.

Level 3 - Moderate use trail with visitor use on a seasonal/and or peak use period with frequent contact between parties. Trail management is conducted with occasional visitor use patrols. Visitors are not likely to encounter obstructions.

(Minimum standard for Level 3) - The trail shall require a minimum of one condition survey 1 to 2 times per season. Major repairs shall be completed annually. Maintenance shall be scheduled two to three times per season, if required, to repair the trail for environmental damage and to maintain access. Trail is kept in good condition.

Level 4 - High use trail used during specific times of the year with high frequencies of contact between parties. Regularly scheduled visitor use patrol and management.

> (Minimum standards for Level 4) - Scheduled maintenance shall occur frequently during the use season (three or four times per season). Trail condition and accessibility for persons with disabilities is a major concern. Significant repairs shall be completed as within 10 workdays.

Level 5 - A special high use trail with routine visitor use patrols and management.

> (Minimum standards for Level 5) - Has a scheduled maintenance program. Trail condition and accessibility for persons with disabilities is a major concern. Significant repairs shall be completed within 2-3 workdays.

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12. MONITORING PROTOCOLS

MONITORING PROTOCOLS

INTRODUCTION

The following protocols are used in current monitoring for riparian vegetation, aquatic habitats, native fish and upland vegetation. Current monitoring will be expanded and developed into a broad ecological monitoring program (discussed in the second part of this section). The monitoring program will be further developed and summarized in the Final Resource Management Plan

RIPARIAN MONITORING PROTOCOL FOR RIPARIAN AREAS OF CIENEGA CREEK AND TRIBUTARIES

Background

BLM inventoried riparian areas along Cienega Creek and its tributaries on public lands from December 1988 through July 1989 (see Chapter 3, Table 3-9). The riparian inventory techniques are outlined in the Phoenix District's Riparian Area Condition Evaluation (RACE) Handbook (BLM 1987d). As a result of the 1988-89 inventory, 11.1 miles (60%) of riparian habitat received ratings of 5-11 for an overall unsatisfactory rating, and 7.5 miles (40%) of riparian habitat received total ratings of 12-16 for an overall satisfactory rating.

In 1993 and again in 2000, BLM re-assessed the riparian areas along Cienega Creek using the riparian evaluation portion of the RACE inventory. The results showed continued improvement along much of the creek. Of the 11.9 miles of riparian habitat evaluated in 1993, 8.5 miles (71%) were in satisfactory condition, and 3.4 miles (29%) were in unsatisfactory condition. Of the 12.5 miles assessed in 2000, 100% were in satisfactory condition (see Chapter 3, Table 3-9; Appendix 3, Riparian Area Conditions and Management). Riparian proper functioning condition assessments completed in 1993 and in 2000 showed similar trends with the percentage of the creek in proper functioning condition increasing from 2% to 61% (see Chapter 3, Table 3-10, Appendix 3, Riparian Area Conditions and Management).

Protocol

Riparian condition of Cienega Creek, Empire Gulch, Mattie Canyon, and Gardner Canyon will be reassessed every five years using the condition assessment portion of the Riparian Area Condition Evaluation (RACE) inventory as well as the Bureau's Riparian Proper Functioning Condition Assessment.

In addition, 5 key riparian segments will be selected along Cienega Creek for more comprehensive evaluation. These minimum ½ mile segments will also be sampled every five years.

In riparian key areas which are dominated by a cottonwood-willow vegetation community, ten belt transects, 10 feet in width, and spanning the entire floodplain, perpendicular to the stream, will be sampled; the distance between transects will be approximately 250 feet. Within each belt transect, the total number of seedlings, saplings, mature and old trees will be counted by species. The length of each transect (across the flood plain) will also be recorded so that densities of the different age-classes can be calculated for each site. Seedlings are defined as plants less than 1 inch diameter at breast height (dbh) or less than six feet tall; saplings are defined as plants 1-6 inches dbh or greater than six feet tall; mature trees are defined as 6-20 inches dbh; and old trees are defined as greater than 20 inches dbh. For seedlings, utilization (based on browsing of apical stem) will be measured on a subsample of 50 or 100 seedlings (depending on availability) spread over the 10 bands. At each band, the lengths of six different ecological sites (aquatic, regeneration zone, river wash, lower terrace sand bottom, mid terrace sand bottom, upper terrace loamy bottom, upper terrace loamy woodland) will also be measured across the flood plain. These lengths will be used to calculate the percentages of each riparian ecological site at each key segment. Two photo points will be established at each site and two photographs will be taken at each photopoint, one facing upstream and one downstream.

Since the intensive riparian monitoring described above was developed, the vegetation along much of Cienega Creek has made the transition to a cienega dominated system. Monitoring methodologies for riparian key areas dominated by cienega plant communities are still being determined. At a minimum, the percentage of marsh habitat will be monitored using aquatic habitat sampling (see method below), plant composition of upper and lower banks will be monitored in plots along transects, and the percent vegetation cover on stream banks will be monitored according to Platts et al (1983).

AQUATIC HABITAT MONITORING CIENEGA CREEK

Background

In 1989-90 BLM classified all aquatic habitats along the perennial length of Cienega Creek and inventoried them for characteristics related to fish habitat. BLM inventoried habitat type and 12 parameters of habitat complexity, including depth, vegetation cover in the water, cover overhanging the water's surface, and undercut banks. In 2000 BLM re-assessed aquatic habitats along four segments of Cienega Creek to determine change over the 10-year period (see Chapter 3, Tables 3-11, 3-12, and 3-13). The selected segments varied from 0.28 to 0.52 miles in length. They were monitored for the same fish habitat characteristics as in 1989-90.

Protocol

Aquatic habitats will be re-assessed every five years along Cienega Creek at the permanent monitoring stations established along four stream reaches. The stations, tied to easily identifiable land marks, vary from 0.28 to 0.52 miles in length. Within each monitoring segment, habitats will be classified sequentially using the stream habitat classification schemes in McCain et al. (1989) and Hawkins et al. (1993) with the addition of "marsh" as a habitat type. For each habitat unit, the following parameters important to defining fish habitat will be collected: substrate, length, mean channel width and water depth, maximum depth, woody cover, overstory canopy cover, overhanging vegetation, floating vegetation, emergent vegetation, submergent vegetation, undercut bank, bedrock or boulder ledge. Bank stability will be evaluated by measuring the linear quantity of stable and unstable (or disturbed) stream bank and its apparent cause following methods of Platts et al. (1983). In addition basic water quality parameters including temperature, D.O., pH, water clarity (Secchi depth), and conductivity will be measured.

NATIVE FISH MONITORING - CIENEGA CREEK

Background

Since 1988, native fish populations and habitats have been monitored annually along Cienega Creek. The number of sample locations has varied between three and twelve. The location of these stations is tied to pool habitats. Pool selection varied within specific stream reaches from year to year due to the dynamic nature of channel features.

Protocol
A minimum of 5 stations will be sampled each year along Cienega Creek. At each station, 100-200 m of aquatic habitat will be sampled for native fish using fine meshed (1/8 inch) double weighted seines or a backpack electroshocker, depending on the stream conditions. Prior to sampling, the stream transect will be divided into macrohabitats using the same classification system employed for the Aquatic Habitat Monitoring. Afterwards, each macrohabitat will be sampled independently by a single pass of the appropriate sampling equipment. Fish numbers will be enumerated by species and age-class (juveniles vs. adults). These data will be recorded for each macrohabitat along with the distance of individual seine hauls or the number of shocking seconds in that macrohabitat. From these data, the relative abundance by species and age-class will be calculated and an index (catch per unit effort) to absolute abundance will be estimated by normalizing fish numbers by the distance, area or time sampled. Three photopoints will be established at each monitoring station, one on the downstream end of the transect, one on the upstream end, and one in the center. Two photographs will be taken at each photopoint, 1 looking upstream, the other looking downstream, to document gross channel features along the transect and adjacent to it. All monitoring stations will be sampled annually in September through November.

MONITORING STREAMFLOW - CIENEGA CREEK

Background
BLM measured instantaneous discharge on Cienega Creek monthly from 1988 to 1994 at two stations. One station was located in the reach between Pump and Fresno canyons and the other was located near the confluence of Oak Tree Canyon and Cienega Creek. In 1995 a stream gaging station (water level recorder and galvanized housing) was installed at the site of an old masonry dam on Cienega Creek just above the confluence with Sanford Canyon. Continuous operation of this gage has been limited by maintenance problems and inundation by flood flows. The BLM, in partnership with the U.S. Geological Survey (USGS), will be installing a new continuous recording stream gage at the same location in 2001.

Protocol
Beginning in late 2001, continuous stream flow information should be available from this gage on the USGS real time gage network (http://az.water.usgs.gov/rt-cgi/gen_tbl_pg).

UPLAND VEGETATION MONITORING

Background
Ecological site inventories have been completed for the Empire-Cienega and Empirita allotments. The results of these inventories and locations of monitoring transects are included in Appendix 3.

Vegetation Sampling Procedures
The following vegetation sampling procedures were followed in the delineated ecological site write-up areas to determine the current conditions:

A 500-foot-long transect (or two parallel transects - 250 feet each) was run in each ecological site where there was a notable difference in appearance. One hundred sample plots (40 cm X 40 cm) were read along the transect at five foot intervals. Vegetation composition, production, species frequency, and ground cover were measured in each plot.

Vegetation Composition
The Dry Weight Rank method of estimating plant species composition was used (Methods of monitoring rangelands and other natural area vegetation) by G. Ruyle (University of Arizona, Division of Range management, Extension Report 9043).

One hundred - 40 cm X 40 cm quadrants were sampled along each 500-foot transect. The three most abundant species on a dry weight basis were identified in the quadrant and ranked. The species yielding the highest annual above ground production was given a rank of 1, the next highest a 2, and the third highest a 3. If a quadrant had less than three species, more than one rank was assigned to some species. The dry weight rank method assumes that a rank of 1 corresponds to 70% composition, rank 2 to 20%, and rank 3 to 10%. These weighing factors were derived empirically (Mannetje and Haydock, 1963). To estimate percent composition for the species within the write-up area, the ranks for each species were summed, multiplied by the weighing factor for each rank, and divided by the sum of the weighted ranks for all species combined.

Vegetation Production
The comparative yield method for estimating range productivity was used (Methods of monitoring rangelands and other natural area vegetation) by G. Ruyle University of Arizona, Division of Range management, Extension Report 9043).

Five reference quadrants or standards (40 cm X 40 cm) were selected adjacent to the transect to represent the range in dry weight of standing plant biomass which was likely to be encountered along the 500-foot transect. The five standards were clipped and weighed to document the production. The transect was then run sampling 100 quadrants along the transect. The vegetation yield in each plot was then compared to the standards and placed in the closest rank.

To estimate the total plant production in lbs/acre, the number of quadrants in each of the comparative yield standards is summed and multiplied by the number of grams clipped for that standard. This total is then multiplied by 0.557 to convert the grams to lbs/acre for that standard. This is done for all five standards. These totals are then added together to calculate the total lbs/acre for the ecological site. To calculate the production of an individual species, the percent composition of the species can be obtained by multiplying the percent composition for that species by the total production for the site.

Plant Species Frequency
The relative abundance of each plant species in each ecological site write-up area was determined using the Pace Frequency sampling method (Methods of monitoring rangelands and other natural area vegetation) by G. Ruyle, University of Arizona, Division of Range Management, Extension Report 9043).

Again 100 quadrants (40 cm X 40 cm) were sampled along a 500-foot transect. The frequency of occurrence for each species was calculated. Herbaceous vegetation species (grasses and forbs) were counted as occurring if they were rooted in the quadrant. Trees and shrubs were counted if they were either rooted in or had canopies that overhung the quadrant. The probability of occurrence for a species (total frequency) was calculated by dividing the number of occurrences by the total number of quadrants (100) sampled.

Ground Cover
Ground cover was measured using along the same 500-foot transect by collecting point intercept data. A pointer was attached on the quadrant frame used for sampling. One hundred points were recorded along the transect. The following categories were used to group cover:

Ground Cover Categories	
Bare Ground	0 to 0.24 inches
Gravel	0.25 inches to 3 inches
Rock	>3 inches
Litter (includes annual plants)	

Live Vegetation
- Grass/Forb Basal Cover
- Canopy Cover
- Shrubs/Trees
- Basal Cover
- Canopy Cover

The ground cover "hit" was determined by visualizing the pointer from a raindrop viewpoint. The first category of cover that the raindrop would intercept on its path to the ground was counted as the "hit". The percent cover was then calculated by dividing the number in each category by the total number of points sampled (100).

PROPOSED UPLAND VEGETATION MONITORING

The monitoring methodologies to be used and the timeframes for collection are as follows:

Upland Vegetation Monitoring Schedule

Study Type	**Method**	**Timeframe**
Trend Studies	Pace Frequency	
Ecological Condition	BLM - ESI	
Plant Composition		
Herbaceous Species	Dry Weight Rank	
Woody Species	Clipping Tables	
Plant Production		
Herbaceous Species	Comparative Yield	
Woody Species	Clipping Tables	
Substrate Composition		
Shrub Canopy Cover	Need Protocol	
Ground Cover	Point Intercept	

13. ECOLOGICAL MONITORING PROGRAM
--DRAFT--

INTRODUCTION

In February 2000, the Bureau of Land Management and Sonoran Institute co-sponsored a technical workshop that focused on how to monitor ecological conditions on the Empire-Cienega Resource Conservation Area (RCA) in southeast Arizona. Participants were technical experts from agencies, conservation organizations, academia, and the private sector who have specialized knowledge of the area and its resources.

The goal of the workshop was to frame a threat-based ecological monitoring program for the Empire-Cienega RCA (since designated as the Las Cienegas National Conservation Area) that will ensure both short- and long-term protection of the area's natural resources under a flexible, multi-use management plan.

As a framework for discussions on a threat-based monitoring program, participants reviewed the significant resources and threats which were identified for the proposed Las Cienegas National Conservation Area in the 1999 Cienega Creek Watershed Proposed NCA Assessment.

Significant Resources Identified in the 1999 Cienega Creek Watershed Proposed NCA Assessment:

- Caves and Geology
- History and Archaeology
- Landscape Integrity
- Ranchlands/Ranching
- Recreational Opportunities
- Plant Communities: Upland and Riparian
- Views
- Water Resources
- Wildlife

Significant Threats Identified in the 1999 Cienega Creek Watershed Proposed NCA Assessment:

- Habitat Loss and Fragmentation
- Exotic Animals and Plants
- Groundwater Pumping/Extraction
- Recreation
- Inappropriate Grazing
- Vehicular Traffic, Off-Highway Vehicles
- Urbanization and Development
- Fire Suppression
- Mining
- Channelization

Participants then broke out into 5 groups, each focused on a specific resource category:

1. Water
2. Riparian/Wetland Vegetation
3. Upland Vegetation
4. Aquatic Wildlife
5. Terrestrial Wildlife

Each resource group was tasked with identifying the key ecosystem processes and/or most important resources to monitor for their resource category. For each monitoring component they identified, the five groups then listed the most important monitoring/research questions associated with that component; significant stressors impacting the component; the parameters that should be measured to monitor the condition of the component; and critical linkages among that monitoring component and those addressed by other resource groups. As time permitted, the groups also listed ideas for partnership opportunities and determining thresholds for stressors impacting the system.

RESOURCE GROUP SUMMARIES

The following summaries highlight the key ecosystem processes and resources (i.e., monitoring components) and monitoring parameters that were identified by each of the five resource groups.

This information will be used as the foundation to develop the details of an ecological monitoring program for the NCA.

1. Water Resource Group

Participants: *Bill Branan, Julia Fonseca, Brenda Houser, Lin Lawson, Bill Peachey; facilitated by Shel Clark*

A. Key Ecosystem Processes/Resources:

- Groundwater (Quality and Quantity)
- Surface Water (Quality and Quantity)
- Precipitation

B. Parameters which should be monitored:

Groundwater

Water Quantity:

- Well inventory including current number of wells (baseline) and changes or expansions in network.
- Groundwater levels in riparian monitoring sites – use well points in your cross-sections
- Groundwater levels in areas of potential threats (e.g., the Sonoita area) – use existing wells

Water Quality – in wells (drinking water) and springs:

- Nutrients
- Metals
- SDWA
- Others depending on threats

____Surface Water

___*Water Quantity and Quality:*

- Natural variability in length of perennial stream reaches, driest conditions
- Instantaneous base flows of stream during driest conditions
- Data from fixed-continuous stream gauge (stage, temperature, pH, EC)
- Data from crest-stage recorders in tributaries
- Annual inspection of springs for flows, pH, etc.

Precipitation

- Rainfall from multiple gauges in watershed.

2. Riparian/Wetland Vegetation Resource Group

Participants: *Mark Briggs, Dave Gori, Ron Tiller, Frank Toupal, Marty Tuegel, and Peter Warren; facilitated by Mary Vint*

A. Key Ecosystem Processes/Resources:

Hydrogeomorphological Processes

- Hydrogeomorphology/Proper Functioning Condition (HGM/PFC) stream system assessment[1]
- Groundwater Conditions[2] (depth to saturated soils, recharge)
- Streamflow Characteristics[2] (flow, volume, patterns)
- Channel Morphology and Sediment Movement (aggradation/erosion; bank stability, channel cutting, gully formation)
- Aquatic Habitats[2]

---

[1] See *Applied River Morphology* by Dave Rosgen for information on HGM assessment; the PFC concept is addressed in a number of BLM technical reports.

[2] Note: The riparian resource group did not fill out a separate worksheet on how to monitor groundwater conditions, streamflow characteristics, or aquatic habitats, since the Water Resource and Aquatic Wildlife Groups addressed these components.

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Biotic Resources

- Sensitive Plants (e.g., endangered water umbel)
- Vegetation Mosaic (is it representative, including cottonwood-willow gallery forest, mesquite bosque, sacaton grassland, streambank herbaceous vegetation, and cienega?)
- Sacaton Bottomlands (are they healthy/functioning?)
- Herbaceous Perennials
- Exotic vs. Native Species
- Biodiversity
- Recovery of Agricultural Fields

B. Parameters which should be monitored:

Sacaton Grasslands

- Basal Area and Percent Cover (plots or transects)
- Reproductive Effort (panicle numbers)
- Population Demographics
- Water Stress / Physiology
- Seedling Recruitment (use permanent plots and tagging to track fate of seedlings)
- Percent Cover of Mesquite or Light Interception (PAR or LA1)
- Recovery Patterns (GPS within permanent, reproducible grids established on agricultural fields and/or use low level aerial photography)

Cottonwood -Willow Forest and Stream Channel Vegetation

- Species Composition
- Woody Species Density / Age Classes
- Sapling Density

To monitor species composition, woody species density / age classes, and sapling density, establish stream cross-section transects with sub-plots at intervals.

- Herbaceous Understory Composition Frequency

To monitor herbaceous, streambank vegetation, arrange study plots in a linear array along the channel bank, and record frequency and percent cover using the point intercept method.

Cienega Vegetation

- Cienega Morphology
- Species List
- Density Of Species
- Sediment Input, Stability
- Changes in Cienega Reach Length
- Streamflow
- Depth of Groundwater

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Huachuca Water Umbel

- Map occurrences of patches (if patchy)
- Conduct frequency plot sampling along reaches where distribution is more continuous.

3. Upland Vegetation Resource Group

Participants: *Wally Alexander, Dave Bertelson, Steve Boice, Don Breckenfeld, Grant Drennen, Kristen Egen, David Hodges, Linda Kennedy, Gerald Korte, Phil Ogden, Dan Robinett, Stephen Wood; facilitated by Alex Conley*

A. Key Ecosystem Processes/Resources:

- Precipitation
- Plant Species Frequency, Composition, and Density
- Reference Areas
- Soils
- Cover (Plant, Soil, and Wildlife)
- Utilization / Residual Biomass
- Spread of Exotics / Invaders
- Agave Densities / Nectar Production
- Swales and Drainages
- Fire Records
- Production

B. Parameters which should be monitored:

Plant Species Attributes

- Methods need to be objective (repeatable by different people) so that good estimates of trend can be developed using data from different observers.
- Similarity indexes can be used to assess the progress of a site towards or away from a desired condition. Identifying what is desired is important.
- Frequency and dry-weight rank have been monitored since 1995. Repeat photography is also used at identified key areas. The existing protocol might be improved by adding a measure of density based on the distance to the nearest plant.
- Monitoring data should be used to determine condition and trend for each site.

Soils

- Soil texture, horizons, and depth to restricting layer are good basic measures of soil type and status. Remote imagery can be used to stratify sampling sites.
- Compaction can be monitored by looking at bulk densities and using a densiometer. A penetrometer can provide relative measurements of compaction; a relationship can also be built to convert these measures to bulk density.

- Long-term measurements of soil moisture could be useful.
- Research to correlate changes in soils to changes in vegetative attributes for each soil type would make extensive monitoring much easier.
- Erosion can be monitored by looking at pedestaling and root exposure.
- Visual assessments and repeat photography can be used to monitor headcutting, gullying, and wind erosion.
- Erosion pins can help monitor sheet erosion.
- A ten-point cover frame can be used to measure microtopography
- The WEP model could be useful for erosion prediction, but is data intensive. It uses the distance to nearest plant measurement discussed earlier.
- Measurements of soil crusting could be useful.

Reference Areas

- Reference areas must be big enough to be representative of undisturbed conditions (e.g., big enough to support their own rodent populations), representative of the topography and vegetation types being monitored, and not on an ecotone.
- Reference areas should be set up whenever management is changed, to be used as treatment-specific controls.
- Sampling should be reproducible.
- Documentation of past and current uses should be kept.
- Monitoring should be done at the same time (season) that other sites are monitored.

Cover

- Must first determine what sort of cover and for what managing for-
- Ground cover is being monitored as part of the plant species attribute monitoring (but should be increased from 100 to 400 points per key area).
- Aerial photos can be used to determine tree/shrub cover.
- Canopy cover could easily be added to existing monitoring by estimating Daubenmire cover in each frequency frame.
- For sparrows, grass height and percent of habitat at height x are useful measures. This could be added to existing monitoring efforts by measuring average grass height for each quadrant on the sampling frame.

Utilization

- Formal measurements not currently made but estimates are used in managing livestock.
- Must clearly define type of utilization being measured.
- Timing and method of measurement must be consistent.
- Distribution of utilization is also important; measuring key areas alone may not be enough.
- True utilization is measured after the end of the grazing season
- Stubble height and percent of area that meets criteria are useful measures for determining the amount of cover for sparrows and antelopes.

Exotics and Invasive Species

- Use network of upland vegetation transects.
- Remote sensing to map lovegrass areas and extent.
- Interpretation of historic and recent air photography to measure the extent and rate of mesquite encroachment.

4. Aquatic Wildlife Resource Group

Participants: *Mac Donaldson, Doug Duncan, Jeff Simms, Dale Turner; facilitated by Josh Schachter*

A. Key Ecosystem Processes/Resources:

Ecosystem Processes

- Recharge
- Flooding
- Perennial Surface Flow
- Sediment Balance
- Succession of Riparian Plant Community to a Cienega
- Fluvial Processes that Promote Habitat Diversity (flooding, sediment deposition, etc.)
- Fire
- Nutrient Cycling

Resources (surrogates for processes)

Top Priority
- Water Quality
- Vegetative and Aquatic Habitat Diversity
- Native/Non-native Species
- Invertebrates (snails and aquatic insects)
- Amphibians, Reptiles, and Fish

Priority Resources Overlapping With Other Resource Groups
- Surface
- Water Quantity
- Types of Surface Water (springs. seeps, creeks, marshes
- Ducks and Flycatchers
- Micro-organisms (bacteria, algae)

Non-priority
- Small Crustaceans

B. Parameters which should be monitored:

Vegetative and Aquatic Habitat Diversity

- Watershed Condition (see Upland Vegetation Group)
- Water Quantity (see Water Group)
- Bank Disturbance (amount of exposed bank
- Fire Effects (monitor water quality and sediment)
- Exotic Vegetation (check for presence and distribution)

Amphibians, Reptiles, Fish and Native Species

- Presence, Distribution, and Abundance of Natives and Problem Non-natives

Invertebrates

- Macroinvertebrate Abundance and Diversity

5. Terrestrial Wildlife Resource Group

Participants: *Anita Cramm, Caleb Gordon, Dave Krueper, Janet Ruth, Sherry Ruther, Mike Seidman, Tim Snow, Frances Werner, Jeff Williamson; facilitated by Karen Simms*

A. Key Ecosystem Processes/Resources:

Riparian Specialists

- Birds
- Small Mammals

Grassland Specialists / Endemics (includes sacaton and upland grasslands)

- Birds
- Small Mammals
- Invertebrates
- Biodiversity

B. Parameters which should be monitored:

Riparian Specialists

- song sparrow
- common yellow
- yellow-breasted chat
- red bat

Grassland Specialists/Endemics

Birds

- Site fidelity of sparrows (Cassin's and Botteri's), aplomado falcon
- Density of birds – flushing into nets for sparrows (very intensive); transects for all others
- Biomass/density of grass
    - Grass height 6-8" (average) **may need to modify
    - < 10% shrub composition
    - 75% cover (basal) – grass/grass litter
      Note: need to be added to grassland bird sub-objective
    - compositional diversity of grasses
    - native perennial bunchgrasses (not just blue gramma/Lehmann's)
- Productivity and Survivorship –
- Nest search and nest monitoring – Mayfield method may be most
- Breeding birds on territories
- Point counts of singing birds (Cassin's, Botteri's in sacaton)

Small Mammals

- At a minimum, monitor diversity and density of rodents in a typical river bottom environment and an upland grassland habitat. Also monitor diversity and density of rodents in a mostly native grassland area and in an area dominated by Lehmann's lovegrass to determine whether rodents are being affected by the invasion of this exotic. Measurements should be taken once or twice a year using grid trapping.

- Banner-tailed kangaroo rats (*Dipodomys spectabilis*): map and number mounds and determine if active.

- Bats – Endangered lesser long-nosed bat (*Leptonycteris curasoae*): Monitor use of specific agaves by bats at least every other year during the third week of August over several nights. A different agave should be monitored each night.

- Mist netting along Cienega Creek could be used to periodically sample bat diversity in the area.

Invertebrates: **to be completed**
Biodiversity: **to be completed**

CONCLUSION

This information is a **draft** summary of expert opinion regarding which ecosystem processes and resources should be monitored—and how—in order to ensure that the Empire-Cienega RCA's (now Las Cienega's NCA) water, vegetation, and wildlife resources are protected over both the short and long term under a flexible, multi-use management plan. These recommendations will be incorporated into a threat-based ecological monitoring program for the RCA (now NCA) that will be an integral part of the BLM's Final Las Cienegas Resource Management Plan. Cultural resources, views, and human uses including recreation will be focused on in future efforts so the monitoring program can be expanded to address them (see Monitoring Framework). In addition, if lands are added to the NCA in the future with cave resources, then monitoring protocols for cave resources will also be developed.

APPENDIX 3

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1. WELLS AND RESERVOIRS WITHIN THE EMPIRE-CIENEGA PLANNING AREA

Empire and Cienega Ranch Water Wells

Well Name	Location	Current Use	Well Registration No.
E1	T19S,R17E. Sec 19	Capped	55-608607
E2	T19S,R16E,Sec 12	Capped	55-608608
E3 Irey Well	T19S,R17E,Sec 20	Cattle- Sub Elect to a represso	55-608609
E4	T19S,R17E,Sec 8	Capped	55-608610
E5 Guardo Well	T19S,R17E,Sec21	Cattle - Sub Elect to a represso	55-608611
EP1	T19S,R17E,Sec 10	Capped	55-608606
E13 Rattlesnake Well	T19S,R17E,Sec 10	Cattle - Sub Elect to a represso	55-608617
E6 Oak Tree 2 Well	T19S,R16E,Sec 10	Cattle - Sub Elect to a represso	55-608633
E7 Road Well	T19S,R17E,Sec 9	Cattle - Sub Elect to a represso	55-608612
E8 Bill's Well	T19S,R17E,Sec15	Cattle - Sub Elect to a represso	55-608613
E9	T19S,R17E,Sec 10	Capped	55-6-8614
E10	T19S,R17E,Sec 23	Capped (not located)	55-608615
E11 New Cinco Well	T19S,R17S,Sec 14	Cattle - Sub Elect to a represso	55-608632
E12 New Well	T19S,R17E,Sec 1	Cattle - Sub Elect to a represso	55-608616
E14	T20S,R17E,Sec 22	Capped	55-608618
T1 Box Well	T19S,R17W,Sec 3	Cattle - Sub Elect to a represso	55-608619
T3	T20S,R17E,Sec 2	Capped?	55-608620
T4	T19S,R17E,Sec 32	Capped?	55-608621
T6	T20S, R17E,Sec 4	Capped?	55-608622
Sam Irrig Well 1	T18S,R17E,Sec 26	Capped	55-608624
Sam Irrig Well 2 aka Mac's Well	T18S,R17E,Sec 34	Cattle - Sub Elect to a represso	55-608625
Dyke Spring Well	T18S,R17E,Sec 35	Capped	55-608623
Enzenberg Well 1 (Orchard?)	T19S,R17E,Sec 31	Cattle - Elect Sub to a drinker	55-608626

Empire and Cienega Ranch Water Wells, continued

Well Name	Location	Current Use	Well Registration No.
T2 Empire Gulch Artesian Well	T19S,R17E,Sec 17	Cattle - Sub Elect to a represso Fire - Sub Elect to Airport Strip	55-608628
Johnson Well	T20S,R17E,Sec 4	Cattle - Sub Elect to a represso	55-634284
Airport Well	T19S,R17E,Sec 8	Windmill - not used	55-634285
Sprung Well 2	T20S,R17E,Sec 5	Capped	55-634286
Slow Poke Well	T19S,R17E,Sec 6	Developed for cattle and wildlife (old windmill)	55-634287
Upper Spg Water	T19S,R18E,Sec 17	Wildlife and Cattle Sub Elect and windmill	55-634288
Davis Well	T20S,R17E,Sec 22	Cattle - Sub Elect to a represso	55-634291
Mattie Horiz Well	T19S,R18E,Sec 9		55-634289
Sec 5 Horiz Well	T19S,R18E,Sec 5		55-634290
School Sec Well Highway Well	T20S,R17E,Sec 16		55-634292
Reeves Well	T20S,R17E,Sec 15	Cattle - Old Windmill	55-634293
South "Davis" Well	T20S,R17E,Sec 14	Cattle- Old Windmill	55-634294
Upper Hilton Well aka Alvarez Well	T20S,R17E,Sec 10	Wildlife - Windmill to wildlife tank and exclosure	55-634295
Alvarez Well aka Sprung #1	T20S,R17E,Sec 5	Cattle and Antelope via Sub Elect pump and pipeline to Vera Earl Ranch	55-634296
Hummel House Well	T19S,R17E,Sec 28	Domestic-Sub Elect	55-634297
Hummel Pot Hole Well	T19S,R17E,Sec 27	Cattle - Sub Elect to a represso	55-634298
Lower Hilton Well	T19S,R17E,Sec 24	Wildlife-Old Windmill	55-634299
Cottonwood Well	T19S,R17E,Sec 21	Cattle - Sub Elect to a represso	55-634300
Empire HQ Well #1	T19S,R17E,Sec 18	Domestic and Cattle Sub Elect to the Tower Storage Tank	55-634302
Empire Hq Well #2	T19S,R17E,Sec 18	Back-up to the main well, Sub Elect to Tower Storage	55-634301
Cieneguita Well	T19S,R17E,Sec 16	Cattle-Sub Elect to a represso. Also an abandoned windmill	55-634303
Cinco Well	T19S,R17E,Sec13	Wildlife-Solar Elect to a wildlife exclosure	55-634304

Empire and Cienega Ranch Water Wells, continued

Well Name	Location	Current Use	Well Registration No.
Lower Spring Water Well	T19S,R17E,Sec 12	Old Windmill-not in use	55-634305
Ferguson Well	T18S,R18E,Sec 20	Cattle and Wildlife - Sub Elect to a represso	55-634306
Fresno Well	T18S,R18E,Sec 19	Cattle-windmill	55-634307
Mary Kane Well	T19S,R16E,Sec 35	Cattle-Sub Elect to a represso	55-634310
West Well	T19S,R16E,Sec26	Cattle - Windmill	55-634315
Maternity Well	T19S,R16E,Sec 24	Cattle - Sub Elect to a represso	55-634316
Empire Well	T19S,R16E,Sec 14	Cattle-Sub Elect to a represso	55-634317
Oak Tree Well	T19S,R16E,Sec 2	Cattle-Sub Elect to a represso	55-634318
Road Canyon Well	T19S,R17E,Sec 36	Cattle-Windmill to two repressos	55-634319
Diamond A Well	T18S,R17E,Sec 33	None-Old Windmill	55-634320
North Well	T18S,R17E,Sec 32	Cattle-Sub Elect and Windmill to two repressos	55-634321
49 Well	T18S,R17E,Sec 28	Cattle-Windmill	55-634322
Sam Domestic	T18S,R17E,Sec 27	Capped	55-634323
Field Well	T18S,R17E,Sec 26	Not Used-Windmill	55-634324
Sanford Well	T18S,R17E,Sec 15	Horz Well, may look like a sprg	55-634325
Rockhouse Well	T18S,R17E,Sec 10		55-634327
Rockhouse Well 2	T18S,R17E,Sec 10		55-634326
Oil Test Well	T18S,R18E,Sec 33	Cattle-Sub Elect to a represso	55-634328
Mattie Well	T18S,R18E,Sec 31	Cattle/Wildlife Windmill	55-634329
Wood Canyon Well	T18S,R18E,Sec 30	Cattle/Wildlife Sub Elect and Windmill	55-634330
Edwards Well	T18S,R18E,Sec 29	Not Used - Windmill	55-634331
Apache Spg Well	T18S,R18E,Sec 27	Hand dug Well and Spring Development. Gravity flow to Storage Tank and represso for cattle and wildlife. Spring Box used by campers at Apache cabin.	55-634332
Ferguson Well #2	T18S,R18E,Sec 20	Wildlife/Cattle Sub Elect	55-634333
N Enzenberg Well	T18S,R17E.Sec 34	Not used	55-634334

Empire and Cienega Ranch Water Wells, continued

Well Name	Location	Current Use	Well Registration No.
Adobe Barn Well	T18S,R17E,Sec 35	Recreation/Horses. Sub Elect to pressure tank and corral trough	55-634335
Rex Well-Cienega DomestiC	T18S,R17E,Sec 35	Cienega House Water	55-634357
Enzenberg 2	T19S,R17E.Sec 31	?	55-636223
Harness Well (55-)	T20S,R17E,Sec 17 SWNENE	Cattle/Wildlife Sub Elect to a represso	
Johnson Well (55-)	T20S,R17E,Sec 4 SWSWNE	Not Used-Old Windmill	
Antelope Well (55-)	T20S,R17E,Sec 2 NWNESE	Cattle-Sub elect to a represso	
Milpa Well (55-634356)	T18S,R17S,Sec 36	Not Used Windmill	

Empire and Cienega Ranch Reservoirs

Name	Location	Stockpond Claim No.
N Enzenburg #3 Claim	T18S,R17E,Sec 34 SESWNE	#38-25836
N Enzenburg #2	T18S,R17E,Sec 34 SWSENW	38-25837
N Enzenburg # 1	T18S,R17E,Sec 34 SESENW	38-25838
Lower Hilton	T19S,R17E,Sec 24 SWNWSE	38-25846
Oil Well #2	T19S,R17E,Sec 22 SWSENE	38-25847
Oil Well Tank	T19S,R17E,Sec 22 NESESW	38-25848
Wind Tank	T19S,R18E,Sec 19 SESWNE	38-25849
Boulder Tank	T19S.R18E,Sec 19 NWNENE	38-25850
Apache	T18S,R18E,Sec 21 SWNWNW	38-25858
Edwards	T18S,R18E,Sec 29 SENWSE	38-25859
Wood	T18S,R18E,Sec 30 NWSWSE	38-25860
Cienegita	T19S,R17E,Sec 16 NESWNE	38-25865
Empire	T19S,R18E,Sec 9 SWNWSW	38-25882

Empirita Ranch Water Wells

Well Name	Location	Well Registration No.
Chimenea Well	T18S, R17E, Sec. 2, SENE	55-616215
Wild Cat Well	T17S, R17E, Sec. 34, SENE	55-616169
Karen Well	T17S, R17E, Sec. 36 NENW	55-616170
Ken/Bootlegger Well	T17S, R18E, Sec. 31 SWSE	55-616177
Alfalfa Well	T17S, R18E, Sec. 29 NWNW	55-627739
Gary Well	T18S, R18E, Sec. 8 SWNE	55-616223
JoAnn Well	T18S, R18E, Sec. 10 SWNW	55-616224
Big House Circle Well	T17S, R18E, Sec. 17 SENW	55-507443
Mike Well	T17S, R17E, Sec 23, SENW	55-616166

Empirita Ranch Reservoirs

Name	Location	Stockpond Claim No.
The Lake Tank	T17S, R17E Sec 13 SENW	36-04084 36-64888
Dam Tank	T18S, R18E, Sec. 15, NWNW	38-93877

Rose Tree Ranch Water Wells

Well Name	Location	Well Registration No.
Horse Pasture Well	T.20S., R.18E., Section 21 NWNWNW	55-618578
Pasture Well	T.20S., R.18E., Section 17 NESESE	55-618571
Rose Tree LS Well	T.20S., R.18E., Section 17 NESWNW	55-618570
Rose Tree Submersible Well	T.20S., R.18E., Section 20 NENENE	55-618580
High Lonesome Well	T.20S., R.18E., Section 19 NWSWNE	55-618781
Abner Well	T.20S., R.18E., Section 22 SENWSE	55-618574

Rosetree Ranch Reservoirs

Well Name	Location	Stockpond Claim No.
East Reservoir	T.20S., R.18E., Section 8 SESWSW	38-95359/ 36-42179 for "East Drainage
South Tank	T.20S., R.18E., Section 8 SWNWSW	38-95403
Schock Draw & Reservoir	T.20S., R.18E., Section 9 NESESW	38-95358/ Claim No. 36-42180 for "Schock Draw"
The Flats Draw & Reservoir	T.20S., R.18E., Section 17 SWNENE	38-95357/ Claim No. 36-42181 for "The Flats Draw"
Valley Tank & Wash	T.20S., R.18E., Section 17 SESWNW	38-19591/Claim No. 36-42182 for "Valley Wash"
Rose Tree LS No. 1 Pond	T.20S., R.18E., Section 17 NWSWNW	38-95360
Rose Tree LS No. 2 Pond	T.20S., R.18E., Section 17 NWSWNW	38-95402
Rose Tree LS No. 4 Pond	T.20S., R.18E., Section 17 NENWSW	38-95365
Rose Tree LS No. 7 Pond	T.20S., R.18E., Section 19 SENENE	38-95364
Rose Tree LS No. 8 Pond	T.20S., R.18E., Section 19 NESENE	38-95363
Rose Tree LS No. 9 Pond	T.20S., R.18E., Section 20 SWSWNW	38-95362
Rose Tree LS No. 10 Pond	T.20S., R.18E., Section 20 SWSENW	38-95361
Jack Daniels Reservoir & Draw	T.20S., R.18E., Section 22 SWSWNE	Certificate No. 2990/Stockpond Claim No. 38-19595/Claim No. 36-42184 for "Jack Daniels Draw"
Abner Pond & Wash	T.20S., R.18E., Section 22 SENWSE	38-19593/Claim No. 36-42183 for "Abner Wash"
Old Forester Tank & Draw	T.20S., R.18E., Section 23 NWNENW	Certificate No. 2993/Stockpond Claim No. 38-19596/Claim No. 36-42185 for "Old Forester Draw"
Hill and Hill Reservoir & Draw	T.20S., R.18E., Section 23 SWSWNW	Certificate No. 2992/Stockpond Claim No. 38-19598/Claim No. 36-42186 for "Hill & Hill Draw"

2. SPRINGS WITHIN THE EMPIRE-CIENEGA PLANNING AREA

Empire and Cienega Ranch–Springs

Spring Name	Location	Use	Water Filing No.
Apache	T18S,R18E, Sec 27, NWSE	Developed for cattle, wildlife, humans	36-25963
Sec. 5 Horizontal Well	T18S,R18E,Sec 5 NWSESE	Horizontal Well, 2 Cement Tanks	55-634290
Upper Mattie (various) seeps	T19S,R18E, Sec 5 NESWSE	Undeveloped	36-04353
Mud Spring	T19S,R18E, Sec 28, SENWNW	Undeveloped	36-25960
Empire Gulch	T19S,R17E, Sec 18 NENE	Undeveloped and exclosed from cattle	36-25959
Unnamed Spring	T18S,R17E,Sec 35 SESWNW		36-25962
Cold Water Spring	T18S,R17E,Sec 23 SENWSE	undeveloped	36-25965
Sanford Spring	T18S,R17E,Sec 15 NWSWNE		36-25966

Empirita Ranch–Springs

Spring Name	Location	Use	Water Filing No.
Nogales	T18S,R18E, Sec 11 NESE	Undeveloped, but used by livestock and wildlife	36-64894
Little Nogales	T18S,R18E, Sec 11 NESW	Undeveloped, but used by livestock and wildlife	36-64899
Smitty	T17S,R18E, Sec 28 NESW	developed, but abandoned. Used by cattle and wildlife	55-627736
Wakefield	T17S,R18E, Sec 27 NWNW	undeveloped	36-64896
Bootlegger	T17S,R18E, Sec 31 SESW	undeveloped	36-04110
Fresnita Spring	T17S,R18E, Sec. 33 SWNW		36-04112

3. ECOLOGICAL SITE INVENTORIES IN THE EMPIRE-CIENEGA PLANNING AREA

EMPIRE-CIENEGA RANCH ECOLOGICAL SITE INVENTORY

Range and Woodland Site Legend

(This section by Dan Robinett, NRCS, 1995)

Ten upland range sites and five bottomland sites (2 - woodland sites and 3 - range sites) were mapped on the Empire and Cienega ranches within the Empire-Cienega Resource Conservation Area (RCA). Most of this area is within the Major Land Resource Area 41-3 and is desert grassland. Areas in the southern and western part of the Empire - Cienega RCA are transitional to the Major Land Resource Area 41-1 which is plains grassland and oak-grass savannah. In the hilly country on both the west and east sides of Cienega Creek, northern exposures exhibit plant communities characteristic of the 16-20 in. PZ, while the southern exposures exhibit plant communities characteristic of the 12-16 in. PZ. The ecological site inventory was done by Dan Robinett and Grant Drennen in the fall of 1995. Twenty eight sites were inventoried to document the survey. Transects were marked with steel posts and photos were taken. The inventory techniques used included pace-frequency, dry weight-rank , and comparative yield. In addition100 random poits were measured to determine ground cover. Each site was inventoried with a 100 plot transect using a 40 cm square plot frame. Woodland site overstory was inventoried with a 20 tree zig-zag transect. The inventory took about three weeks.

Limy Upland - One large area of this site occurs on the Empire-Cienega ranch. These are shallow, calcareous soils over cemented lime pans. They are light colored in the upper part. Slopes are nearly level to moderate. A long narrow strip of this site extends from the narrows in Cienega Creek all the way up Apache canyon to its confluence with Montosa Canyon. A large wildfire burned this site in 1991 on the north side of Montosa Canyon. Areas of this site on the south side of the canyon which did not burn show the continued thickening of shrubs on this site in the absence of fire for the last century. The potential plant community on this site was a mixture of grasses and shrubs. The dominant grasses include black grama, bush muhly, blue threeawn, stipa, fluffgrass, and slim tridens. The main shrubs are creosotebush, whitethorn, sandpaper bush, sophora and mariola. Small areas of this site occur in complex with other sites in upper Mattie, Spring Water and Mud Springs canyons. Most areas of this site on the ranch are in good ecological condition. The areas that burned in 1991 are in excellent condition.

Limy Slopes - Large areas of this site occur on the northeastern side of the ranch. It occurs in complex with Volcanic Hills in the Empire Mountain area. It occurs in complex with Loamy Uplands along both flanks of Cienega Creek and in complex with Loamy Hills in the south and west parts of the ranch. These are deep, calcareous soils with dark colors in the upper part and with surfaces well protected by covers of gravels and cobbles. Slopes range from moderate to steep. In the large ridges from Apache canyon all the way to Hilton Wash the southern exposures of this site have the potential of the 12-16 PZ and the northern exposures have the potential of the 16-20 PZ. The potential plant community of the south aspects is a mixture of grasses like, black and sideoats gramas, threeawns, wolftail and slim tridens with low shrubs including, false mesquite, zinnia and range ratany. The potential plant community of the north aspects is a grassland dominated by sideoats grama, New Mexico feathergrass, crinkleawn, wooly bunchgrass, threeawns and black grama. Important shrubs include, false mesquite, ratany, dalea, beargrass, agave, sotol and yucca. All areas of this site on the ranch are in either high good or excellent ecological condition.

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Limestone Hills - Two small areas of this site occur along the northern boundary of the ranch in the Empire and the Whetstone mountains. It also occurs in complex with other sites in upper Mattie, Spring Water and Mud Springs canyons. These soils are calcareous, gravelly loams, shallow to limestone or calcareous sandstone bedrock. They occur on steep slopes and have well developed covers of gravels and cobbles. Large amounts of rock outcrop occur. The potential plant community on this site was a mixture of shrubs, succulents, perennial grasses and forbs. The main grasses are sideoats and black gramas, slim, rough and shortleaf tridens, southwest stipa, blue threeawn, Hall's panic, bush muhly and spike pappusgrass. Important forbs are croton, twinberry, bahia, globe mallow, penstemon and ground cherry. The main shrubs are ocotillo, Mearns sumac, agave, sotol, prickley pear, dalea, ratany, mint-bush, false mesquite, littleleaf and skunkbush sumacs, desert zinnia, sandpaper bush, sophora and shin dagger. Southern aspects have the potential of the 12-16 in. PZ and northern aspects have the potential of the 16-20 in. PZ. Most areas of this site on the RCA are in good ecological condition and need fire to progress toward excellent condition.

Volcanic Hills - A large area of this site occurs in complex with Limy Slopes in the Empire mountains. Another large area occurs in the Whetstone mountains and scattered areas occur in complex with other sites in Upper Fresno, Mattie, Spring Water and Mud Springs canyons. Soils are shallow and loamy to quartzite and volcanic bedrock. Soil surfaces are well protected by covers of rocks and gravel. They are not calcareous and slopes are moderate to very steep. On the Whetstone mountain side northern aspects have the potential of the 16-20 in. PZ and southern aspects have the potential of the 12-16 in. PZ. The potential plant community of the north aspects is an open canopy of juniper , Emory and Arizona white oak with an understory of perennial grasses, forbs and low shrubs. Dominant grasses are plains lovegrass, sideoats, purple and hairy gramas, green sprangletop, bullgrass, vine mesquite, Texas bluestem, cane beardgrass, prarie junegrass and squirrletail. Important shrubs include mimosa, shrubby buckwheat, agave, yerbe de pasmo, beargrass and skunkbush sumac. The potential community of the south aspects is a diverse mixture of shrubs, succulents, grasses and forbs. The main grasses include sideoats, slender, hairy, sprucetop and black gramas, curley mesquite, plains lovegrass, cane beardgrass, green sprangletop, wolftail and threeawns. The main shrubs are false mesquite, ratany, mimosa, shrubby buckwheat, ocotillo, agave, prickley pear, shin dagger and bananna yucca. Most areas of this site on the ranch are in high good ecological condition. Some areas in the Whetstone Mountains on north aspects are in fair condition due to grass mortality in the last few drought summers and a bumper crop of annual goldeneye in the spring - summer of 1995. These areas had not been grazed during this drought period.

Basalt Hills - One small area of this site occurs south of the narrows flanking Cienega creek. Soils are shallow and clayey. They are also calcareous and formed on bedrock of diabase, shale and related parent materials. Soil surfaces are well protected by covers of cobbles and stones. The potential plant community is a diverse mixture of shrubs, succulents, grasses and forbs. Tobosa and black grama are the dominant perennial grasses. Other grasses include tanglehead, sideoats and slender gramas, threeawns and slim tridens. Common forbs include croton, twinberry, bahia, perezia, hibiscus, trailing four o'clock, spiny goldenhead and grass nuts. The main shrubs are whitethorn, mariola, mintbush, ocotillo, prickley pear, agave, false mesquite, ratany and trixis. This site is in good ecological condition on the ranch.

Clayey Hills - This site occurs in complex with other sites on the northern end of the RCA in Apache, Fresno and Woods canyons on the east side and in Fortynine and Stevenson canyons on the west side. Soils are shallow and clayey. They are non calcareous and are on parent materials like andesite, tuffs and breccias. Slopes are moderate. The potential plant community is dominated by grasses like tobosa, curley mesquite and sideoats grama. Common shrubs include false mesquite, ratany, mimosa, prickley pear and shin dagger. Areas of this site on the ranch are in low good ecological condition.

Loamy Hills - This site occurs as a large unit in the Empire and North pastures and in the West, Hilton and Davis pastures in complex with limy slopes. Soils are deep and loamy textured. They have surfaces that are well protected by covers of rocks and gravels. Slopes are moderate to steep. North aspects have the potential of the 16-20 inch PZ and southern aspects have the potential of the 12-16 inch PZ. The potential plant community of the northern aspects can have an overstory of Mexican blue, Arizona white and Emory oaks with some one-seed juniper. The understory is dominated by mid-grasses like bullgrass, sideoats and hairy gramas, plains lovegrass, Texas bluestem, beggartick threeawn, green sprangletop and squirreltail. Common shrubs are beargrass, agave, false mesquite, shrubby buckwheat, yerbe de pasmo, herbaceous sage, dalea and mimosa. Important forbs include annual goldeneye, cudweed, stolon daisy, thistle, rosary bean, locoweeds, wild beans and Wrights lotus. The potential plant community on the south aspects is dominated by a mixture of grasses, low shrubs, succulents and forbs. The main grasses include sideoats, slender, hairy and sprucetop gramas, plains lovegrass, falls witchgrass, tanglehead, cane beardgrass and curley mesquite. The dominant shrubs are false mesquite, range and spreading ratanys, mimosas, prickley pear, hedgehog cactus, rainbow cactus and agave. Important forbs include evolvulous, sida, dychoriste, lotus, locoweed, cudweed, camphorweed, annual goldeneye and aster. Palmers agave reaches its best development on southern aspects of this site. Most areas of this site on the RCA are in high good ecological condition. Some areas on north slopes in the North and Empire pastures are in lesser condition due to grass mortality during the last few summer drought years and the tremendous goldeneye of the spring-summer of 1995.

Loamy Upland - This site occurs in two different physiographic areas on the RCA. It occurs on the first (lower) upland terrace out of Cienega Creek in complex with Sandy Loam Uplands. In this area it has the potential of the 12-16 inch PZ. It also occurs extensively in the southern and western plains on the second (higher) upland terrace area. Here its potential is transitional between the 12-16 inch PZ and the 16-20 inch PZ. These soils are deep , have thin gravelly sandy loam surfaces (2-3 in. thick) over clayey subsoils. Slopes are nearly level to moderate. The potential plant community of the lower terrace area is a grassland dominated by sideoats, blue, hairy and sprucetop gramas, plains lovegrass, cane beardgrass, wolftail and threeawns. Common shrubs include false mesquite, range and spreading ratanys. The main forbs are evolvulous, zinnia, sida, dychoriste, indian wheat and aster. Presently most of this site is dominated by mesquite and burroweed with lesser amounts of sideoats, blue and sprucetop gramas, threeawns, Lehmann lovegrass and curley mesquite. These areas are in high fair ecological condition and will need control of both mesquite and burroweed to reach their potential. The potential plant community of the upper terrace areas is dominated by midgrasses like sideoats grama, cane beardgrass and plains lovegrass with lesser amounts of blue, sprucetop and hairy gramas, wolftail and threeawns. Important shrubs include spreading ratany, false mesquite, agave, groundsel, shrubby buckwheat and yerbe de pasmo. Common forbs are rosary bean, greenthreads, greeneyes, dychoriste, stolon and rush daisies, evolvulous, sida, cudweed, matweed, snake cotton, zinnia, and thistle. Present day plant communities in this area are approaching their potential and condition is high good. Increases in the native midgrasses are needed to get ecological condition up to excellent. Also included in this area are soils which are similar to Loamy Upland soils but are calcareous in the clayey horizon. These soils produce a plant community similar (in kinds and amounts of plants) to Loamy upland with the addition of several lime loving plant species. It has not yet been described and should be called Limy loam upland and broken out of the Loamy upland site. Loamy uplands also occur in complex with Limy slopes along both sides of Cienega creek and in minor amounts in the large ridges of Limy slopes form Apache canyon south to Hilton wash. In these areas its present day condition is dominated by mesquite with a turf of short gramas and curly mesquite. Ecological condition in these areas is fair.

Sandy Loam Upland - This site occurs primarily on the first (lower) terrace area out of Cienega Creek in complex with Loamy Uplands. The soils are very similar to those for Loamy Uplands except these have much thicker (8-12 in.) surfaces of sandy loam over the clayey subsoils. Slopes are nearly level. The potential here is that of the 12-16 inch PZ and is a grassland dominated by black, sideoats, hairy, slender, Rothrock and sprucetop gramas, plains lovegrass, plains bristlegrass, Arizona cottontop, threeawns and cane beardgrass. Important forbs are evolvulous, sida, cudweed, camphorweed, wild beans, small matweed, daisy, zinnia and aster. Presently all areas of this site on the RCA have an overstory of mesquite with burroweed in the understory in varying amounts. About half of the area of this site on the ranch been taken over by Lehmann lovegrass. Some areas of this site especially in the North and Enzenberg pastures are in good ecological condition even with the mesquite cover because they have excellent stands of native perennial grasses. Areas dominated by Lehmanns cannot be rated in ecological condition. Lehmann lovegrass reduces the diversity of native plant and animal species but provides adequate soil protection, similar biomass production and may actually be better able to compete with cool season shrubs like mesquite and burroweed than the native grama grasses. Throughout areas of this site, even with Lehmann present, plains lovegrass is increasing and moving into new areas.

Shallow Upland - This site occurs in complex with other sites in Rockhouse and Stevenson canyons on the northwest side of the ranch and in Apache, Fresno and Woods canyons on the northeast side. Soils are shallow or very shallow over hard bedrock of quartzite, rhyolite or sandstone. They are loamy textured and not calcareous. Slopes are nearly level to moderate. The potential plant community is a mixture of perennial grasses and forbs with several species of low shrubs. Important grasses are sideoats, black, hairy, slender and sprucetop gramas, curley mesquite, threeawns, aparejo grass, wolftail and plains lovegrass. The main shrubs are false mesquite, range ratany, dalea, mimosa, ocotillo, agave, prickley pear, zinnia and shrubby buckwheat. Areas of this site on the RCA are presently in good ecological condition.

Loamy Bottom - Swales - This site occurs in complex with Loamy Uplands throughout the west and southern parts of the ranch. It receives extra moisture as a result of runoff from adjacent upland sites. Soils are deep, dark colored silt loams and silty clay loams. Slopes are nearly level. The potential plant community is grassland. Dominant grasses include blue and sideoats gramas, vine mesquite, aparejo grass, cane beardgrass and plains lovegrass. Minor amounts of tobosa and sacaton occur on this site. Important forbs in the plant community are hog potato, spreading globe mallow, coyote melon, buffalo gourd, sunflower, goldenrod and knotweed. Most areas of this site in the north part of the Hilton pasture and in the Johnson and Enzenburg pastures are in low good ecological condition. Some of these swales gullied in the past, are in the process of healing, and most of them have been invaded with mesquite. Most areas of this site in the south part of the Hilton and in the West and Davis pastures are in high good ecological condition with little or no mesquite and very few gullies. Within the area delineated as this site there are inclusions of Clayey bottom range site. These soils are clays with high shrink-swell and exhibit churning and cracking. They are dominated by tobosa and vine mesquite and have similar production as the swales range site. They make up less than ten percent of the unit.

Loamy Bottom - Subirrigated - This site occurs as the primary floodplain of major creeks like Empire, Gardener and Cienega. It receives extra moisture during summer floods and has a seasonally high (4 - 8 feet) water table. Soils are deep, dark colored and heavy textured. Slopes are nearly level. The potential plant community is a sacaton meadow. Minor grasses include blue grama, alkalai sacaton, vine mesquite, sideoats grama and aparejo grass. Common forbs are conzya, sunflower, ragweed, mares tail, pigweed, lambs quarter, coyote melon and buffalo gourd. Most areas of this site on the ranch are in high good to excellent ecological condition. Some areas have been invaded by mesquite but are returning to open sacaton as the bottom becomes wetter and fires burn in these areas, eliminating mesquite. Some areas are drier than others due to channel cutting and deepening that initiated at around the turn of the century. Production on the drier sacaton sites like the Gardener may average about 3000 lbs. per acre. Production on more dependably flooded fields like the Five Wire and the 500 Acre pastures will range from 5000 to 6000 lbs. per acre. Included in the area delineated as this site are small areas which are marshy. They are true wetlands with water at or near the surface year round. These soils are very dark, heavy textured and feature the redoximorphic (gleying and mottling) features, characteristic of poorly drained soils. They are dominated by sedges, rushes, bullrushes, cattails and forbs like bidens and yerbe mansa. These areas are a

"Cienega Site" which has not yet been described and will be in the future as more information can be gleaned about it.

Loamy Bottom - Mesquite - This is a woodland site as it has over 15 percent tree canopy in the potential. This site occurs as a high stream terrace along the steeper reaches of Cienega Creek. It no longer benefits from extra moisture received as flooding but does have a water table at depths of 20 to 40 feet which mesquite roots can reach. Soils are deep, light colored loams and silt loams. Slopes are nearly level. The potential plant community is a mesquite bosque. Canopy of mature velvet mesquite can be as high as 50 percent and trees can reach heights of 40 feet. Other common trees on this site include Mexican elderberry, western soapberry, netleaf hackberry and catclaw acacia. The main shrubs in the understory are wolfberry, greythorn, fourwing saltbush, desert honeysuckle, desert hackberry, crucillo and mimosa. Several vines are important on the site including climbing milkweed, virgins bower, Mexican passion flower and morning-glory. Common understory grasses are sacaton, vine mesquite, green sprangletop, plains bristlegrass, squirreltail and dropseeds. Important forbs on this site are annual mustards, pigweed, lambs quarter, sunflower, ragweed, copperleaf and wheelscale. Most areas of this site on the ranch are at or near their potential. Some areas on the ranch (i.e. around Dominguez water) have been cut for firewood and/or bulldozed. Removal of the mesquite overstory on this site can lead to a shrubby regrowth of greythorn, mimosa, wolfberry and mesquite. If salt cedar is present in the watershed it can take over areas of this site where the mesquite canopy has been removed.

Some areas along Cienega Creek resemble this site due to past mesquite invasion of the sacaton meadows. Soils in these areas are the dark colored silty clays and clay loams which developed under dense sacaton. If these areas still have the potential to flood and produce continuous growth of sacaton they will eventually burn often enough, with intense fires that will take out the mesquite.

Sandy Bottom - This site occurs as low stream terraces along drainageways of the major tributaries to Cienega Creek. It benefits from extra moisture received in flooding and as runoff from adjacent uplands. It does not have a water table within the reach of tree roots. Tree canopy on the site is less than 15 percent in the potential making this a range site by definition. Soils are deep and sandy. Slopes are nearly level. The potential plant community on this site is a diverse mixture of trees, shrubs, vines, grasses and forbs. Important trees are mesquite, catclaw acacia, desert willow, netleaf hackberry, Arizona black walnut, western soapberry, Arizona ash, and in some places Arizona white oak and Emory oak. The major shrubs are mimosa, burrobrush, southwest rabbitbrush, desert honeysuckle, fourwing saltbush, skunkbush, desert broom, littleleaf sumac and wolfberry. Vines include virgins bower, canyon grape, climbing milkweed, morninglory and Mexican passion flower. The main grasses are sacaton, spike dropseed, sand dropseed, sideoats grama, green sprangletop, bulb panic, cane beardgrass, Arizona cottontop, plains bristlegrass, deergrass and beggartick threeawn. Important forbs are thistle, coyote melon, wild cotton, sacred datura, sorrel buckwheat, mares tail, lambs quarter, ragweed and pigweed. Most areas of this site on the RCA are in good ecological condition.

Sandy Bottom - Subirrigated - This site occurs as the low stream terrace and streambanks of the wet reaches of Cienega, Empire and lower Mattie canyons. It benefits from extra moisture received as flooding and also from high water tables (4 to 10 feet). Soils are deep and sandy. Slopes are nearly level. The potential plant community is a deciduous riparian woodland dominated by Fremont cottonwood and black willow. Tree canopy can be as high as 70 percent on this site. Other trees found in minor amounts include Arizona ash, Arizona black walnut, Mexican mulberry, desert willow, coyote willow and netleaf hackberry. Common shrubs in the understory are batamote, desert honeysuckle and skunkbush sumac. Canyon grape vine is very common with cissus occuring in minor amounts in rock floored areas. Important grasses are deergrass, sacaton, bulb panic, rice cutgrass, knotroot paspalum, Arizona wildrye, sedges, rushes and bullrush. Important forbs are stickseed bidens, watercress, monkeyflower, water speedwell, cow parsnip, yerbe mansa, pink smartweed, spiny aster, goosegrass, meadow rue, sunflower and ragweed. Most areas of this site on the RCA are approaching their potential. Throughout areas of this site, even with Lehmann present, plains lovegrass is increasing and moving into new areas.

Shallow Upland - This site occurs in complex with other sites in Rockhouse and Stevenson canyons.

EMPIRE RANCH ESI - Upland Vegetation Transect Locations

Pasture - Unit	Township	Range	Section	Study No.
#1 Shipping Pasture	19S	17E	18 NESE	1
North (Oak Tree N-aspect)	19S	16E	11 NENW	2
North (Oak tree S-aspect)	19S	16E	11 NENW	3
North (North end)	18S	17E	29 SWSE	4
Upper 49 (South end)	18S	17E	29 SENE	5
Rockhouse	18S	17E	10 NESW	6
Rockhouse	18S	17E	10 NESW	7
North (rattlesnake)	19S	17E	9 NWSW	8
Alamo Solo	19S	17E	20 NWSE	9a
Alamo Solo	19S	17E	20 NWSE	9b
Johnson	19S	17E	33 SENW	10
Hilton (Road Cny North aspect)	19S	17E	36 NESE	11
Hilton (Road Cyn South aspect)	19S	17E	36 SENE	12
Hilton (Heart S)	20S	17E	16 NWNW	13
Davis (West)	20S	17E	15 SESW	14
Davis (Middle)	20S	17E	11 NESE	15
Spring Water (L Hilton well)	19S	17E	24 SWSW	16
West (Outside exclosure)	19S	16E	26 NWNE	17
West (Inside exclosure)	19S	16E	26 NWNE	18
5 Wire	19S	17E	11 NWSW	19
Lower Mattie	18S	17E	36 NWNE	20
Upper Mattie	19S	18E	4 SESW	21
Fresno	18S	17E	25 SENE	22
Triangle	18S	18e	7 SWNW	23
Rockhouse (Falls)	18S	17E	14 SESE	24
Fresno (Dominguez)	18S	17E	13 NENW	25
Rockhouse (W of Narrows)	18S	17E	1 SESE	26
Apache (burned)	18S	18E	35 SESW	27
Apache (unburned)	18S	18E	21 SWNE	28

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Ecological Site Condition Empire-Cienega Ranch

Ecological Site	Study No.	Acres	Existing Condition (1995 ESI Similarity Index % of Historic Climax Present)	Production Lbs/ac	1995 Esi %Comp.- Perennial Grass	1995 Esi % Bare Ground
Loamy Hills-	11	10050	Excellent (85)	1522	63	9
	12		Good (59)	931	83	22
Limy Slopes	15		Good (61)	931	79	16
Loamy Upland-	13	6577	Excellent (77)	764	93	21
	17		Good (63)	670	60	13
	18		Fair (42)	382	53	24
Swales	10		Good (55)	1866	45	32
	14		Excellent (77)	1888	93	26
Sandy Loam Upland-	8	11523	Fair (44)	1083	66	40
	9A		Fair (31)[1]	1230	69	42
Loamy Upland	9B		Fair (32)[2]	949	64	68
	1		Good (54)	1068	74	30
	16		Fair (50)	778	82	25
Loamy Upland- Limy Slopes		6454				
Loamy Hills	2	6058	Excellent (92)	1939	49	9
	3		Good (72)	858	76	20
Limy Slopes	4	10765	Good (60)	908	76	23
	22		Good (54)	775	71	6
Volcanic Hills-	7	3643	Good (72)	1947	72	3
Limy Slopes	6		Excellent (85)	776	70	20
Limestone Hills-	21	4423	Good (66)	3330	35	11
Limy Upland- Volcanic Hills	28		Good (60)	764	32	-
Volcanic Hills- Shallow Upland- Clay Hills	5	5036	Good (66)	597	54	19
Volcanic Hills	27	1669	Fair (34)	2609	12	7
Limestone Hills	26	497	Good (67)	975	975	10
Basalt Hills	23	600	Good (71)	1341	58	5
Loamy Bottom (subirrigated)	19	3744	Good (66)	5510	60	24
Loamy Bottom (woodland)	24	581	TreeCanopy 80%	1612	8	8
	25		TreeCanopy-open	1395	12	36
Sandy Bottom (subirrigated)	Riparian	608				

Ecological Site Condition Empire-Cienega Ranch, continued

Ecological Site	Study No.	Acres	Existing Condition (1995 ESI Similarity Index % of Historic Climax Present)	Production Lbs/ac	1995 Esi %Comp.- Perennial Grass	1995 Esi % Bare Ground
Sandy Bottom (swales)	20	1528	Good (65)	3974	63	20
Limestone Hills/Limy Upland/Volcanic Hills		4423				
Limy Slopes/Limy Upland		50				

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[1] 31 (Fair) The score does not count Lehman Lovegrass (35% composition) because it is not native

[2] 32 (Fair) The score does not count Lehman Lovegrass (41% composition) because it is not native

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EMPIRITA RANCH
ECOLOGICAL SITE INVENTORY

The Ecological Site Inventory was completed in 1994 on the Empirita Ranch. The mapping was done by Kristen Egen of the NRCS.

There are seven range sites on the ranch which all fall in the desert grassland resource area (MLRA 41-3). Soils were mapped in the mid-1980s as part of the soil survey of Eastern Pima County. The following is a brief description of each range site including current and potential condition.

Limy Upland - These are shallow in depth over alluvium. They are limy throughout and may have limy pans or conglomerates. The surface is gravelly. Soils mapped here are Kimrose. Slopes range from 1 to 40% on hillslopes across this unit. Elevations are 3600 to 4800 feet. Most areas of this site are in good condition. The exceptions are the south end of Smitty and the north end of Little JoAnn which are in fair condition. Also, the south 1/4 of Little Joann which is in excellent condition. The present day and potential plant communities on this site are dominated by bush muhly and black grama. Important shrubs include creosote bush, whitethorn acacia and false mesquite. In the areas in fair condition there has been a substantial invasion of sandpaper bush. The areas in excellent condition have had a wildfire in 1989 which knocked back the sandpaper bush.

Limy Slopes - These are shallow to deep soils over alluvium, schist, and fanglomerate. They are calcareous throughout and have lime pans. The surface is very gravelly. Soils mapped here are Powerline, Tombstone, and Deloro. Slopes range from 1 to 40 % on hillslopes with elevations from 3600 to 4800 feet. Most areas of this site are in good condition. The exception is the north half of Little JoAnn which is in fair condition. The present day and potential plant communities are dominated by sideoats grama and black grama. Major shrubs include false mesquite, yucca, ocotilla, and desert zinnia. The fair condition sites, again have sandpaper bush invading. Where fire has occurred, this has begun to resprout.

Volcanic Hills - These are shallow soils on basic igneous rocks, shale, and conglomerate. They are clay loam textured with many cobbles and gravels on the surface. Soils mapped here are Deloro and Pantak. Slopes range from 15 to 70% and elevations are from 4000 to 4600 feet on the ranch. All areas are in good condition except a hill near the Narrows which is in fair condition with excessive erosion. The present day potential plant communities are dominated by sideoats grama. Major shrubs are false mesquite and mesquite. The only species which is in smaller amounts than potential is plains lovegrass which is very palatable and will often decrease with slight grazing. Shrubs have increased in areas also due to the lack of fire.

Limestone Hills - These are shallow soils on sedimentary and metamorphic bedrock which is limy. Rock outcrop sites occur here also. The soil mapped here is Saguaro. Slopes range from 20 to 70% and elevations range frrom 4800 to 5100 feet. This site is in good condition. The present day and potential plant community is sideoats grama with a mix of many other grasses making up 55 to 70% of the plant community. There are many shrubs all making up less than 5% per species. This site is found in the southeast corner of the Little JoAnn pasture and much of it has burned within the last 10 years.

Loamy Upland - These are deep soils on loamy alluvium on fan terraces and stream terraces. They have a clay horizon near the surface. Soils here are Whitehouse, Caralampi, and Nolam. Slopes range from 1 to 15% and elevations are 3800 to 4000 feet on the ranch. This site ranges from poor condition in the Wildcat pasture where the cattle seem to camp, to fair condition with an upward trend in the Alfalfa, to good condition in the Anderson Bull where little use occurs. The present day plant communities are mainly burroweed, yucca, and mesquite. The areas in fair to good condition have much more grama grasses. The potential for this site is mainly sideoats grama, plains lovegrass, and cane beardgrass making up 75 to 85% of the composition. This site is showing improvement.

Sandy Bottom - These are very young soils on sandy or gravelly alluvium in the floodplain and on the terraces. It benefits from extra moisture during runoff periods. Soils mapped here are Comoro. Slopes are 0 to 2% and elevations range from 3600 to 4000 feet on the ranch. Areas of this site are in fair condition. The present day plant communities are bermuda grass, rushes, desert willow, and mesquite. Potential for this site is 40 to 55% mixed grasses, with mesquite and willow at only 10 to 15% (the opposite is occurring now). This site encompasses Cienega Creek from the Narrows down to the highway and several smaller washes which feed into it. The combination of heavy loads of water and grazing have caused disturbance to this site.

Deep Sandy Loam - These soils are formed on recent sandy alluvium and have a sandy loam texture. Soils mapped here are Keysto. Slopes range from 1 to 5% and elevation are from 3600 to 4000 feet. This site is along the terraces of Cienega Creek. The site is in fair condition throughout the ranch. The present day plant community is alkali sacaton and mesquite. The potential plant community is mainly cottontop, sideoats grama, and spike dropseed. Major trees and shrubs potentially should only occur as 15 to 20% of the composition. This is a site where animals will spend much time due to the shade and nearby water. With rest rotation this site should begin to show improvement.

Ecological Site Inventories for Rosetree, Vera Earl, and the Empire Mountain Areas

The soils have been mapped for these portions of the planning area. The range sites have not been delineated, nor the sites inventoried using the Ecological Site Inventory Methodology.

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Range Site Condition Empirita Ranch (1994)

Ecological Site	Study No.	Acres	Existing Condition (1994 ESI Similarity Index % of Historic Climax Present)	Production Lbs/ac
Basalt Hills		<1		
Deep Sandy Loam /Sandy Bottom		1494	Good	
Loamy Bottom Subirrigated (sacaton) 41-3 (inclusion)	O'Leary (17S,17E,1)			
Sandy Bottom 41-3	O'Leary (17S,18E,7)		Poor	
	Alfalfa (17S,18E,20)		Fair	
Loamy Upland/Limy Slopes Complex 41-3	Wildcat (17S,17E,26)	893	Poor	
Loamy Upland 41-3	KA3* (17S,18E,29) (Smitty #5)	115	Good	
Limestone Hills/Limy Upland/Volcanic Hills		6		
Limestone Hills 41-3	(18S,18E,14) (Little JoAnn)	920	Good	
Sandy Bottom-Subirrigated 41-3	Narrows (18S,18E,6)	5	Fair	
Volcanic Hills 41-3	Anderson (17S,18E,15)	416	Good	
Volcanic Hills/Limy Slopes	Wildcat (17S,17E,34)	3586	Good	
Limy Upland/Limy Slopes Complex 41-3	KA1* (17S,17E,13) (O'Leary #2)	19370	Good	
	(17S,18E,21)		Excellent	
Limy Upland	Smitty (17S,18E,33)		Fair	
Limy Upland	O'Leary (17S,17E,2)		Excellent	
Limy Upland	Narrows (18S,18E,5)		Excellent	
	House (17S,18E,20)		Good	

Range Site Condition Empirita Ranch (1994), continued

Ecological Site	Study No.	Acres	Existing Condition (1994 ESI Similarity Index % of Historic Climax Present)	Production Lbs/ac
	KA2* (17S,17E,25) (Wildcat #3)		Good	
Limy Upland	Crystal (17S,18E,26)		Good	
Limy Upland	Smitty (17S,18E,29)		Good	
Limy Slopes	O'Leary (17S,17E,14)		Good	
Limy Slopes	JoAnn (18S,18E,15)		Fair	
	JoAnn (18S,18E,3)		Fair	
	Wildcat (17S,18E,30)		Good	

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4. RIPARIAN AREA CONDITIONS AND MANAGEMENT

Riparian Area Condition Evaluation (RACE) 1989/1993/2000 Summaries for Cienega Creek

Segment			**1988/89**		**1993**		**2000**	
Number	Location	BLM Length	Score	Rating	Score	Rating	Score	Rating
59AA	Bootlegger to Narrows	1.5 mi	-	-	9	U	15	S
59A	Narrows to Apache Canyon	0.3	10	U	13	S	14	S
59B	Apache to Fresno Canyon	0.3	13	S	14	S	14	S
59C	Fresno Canyon to Bedrock Falls	1.6	16	S	15	S	16	S
59D	Bedrock Falls to Pump Canyon	0.4	12	S	13	S	16	S
59E	Pump Canyon to Cienega Falls	0.6	13	S	11	U	14	S
59F	Cienega Falls to Mattie Canyon	0.5	11	U	12	S	15	S
59G	Mattie Canyon to Cold Spring	0.5	13	S	16	S	16	S
59H	Cold Spring to Agricultural Fields	1.0	11	U	13	S	11	U
59I	Agricultural Fields to Canal	1.7	10	U	15	S	12	S
59J	Canal to Oak Tree Canyon	0.9	9	U	12	S	15	S
59K	Oak Tree to Spring Water Canyon	0.3	9	U	12	S	12	S
59L	Spring Water to Gardner Canyon	1.0	10	U	12	S	15	S
59M	Gardner to Head Waters	1.3	13	S	9	U	16	S
59O	near Oil Well Canyon	0.6	11	U	-	-	11	U
	Mean Score	**12.5 mi**	**11.5**	**U**	**12.8**	**S**	**14.1**	**S**

Riparian Proper Functioning Condition Assessment and Associated Management Actions 2000 Summary for Cienega Creek

Segment Number	Segment Location	Rating	Year Management Implemented	Management Action
59AA	Bootlegger to Narrows	PFC	late 2000	Riparian Fencing
59A	Narrows to Apache Canyon	FAR	late 2000	Riparian Fencing
59B	Apache to Fresno Canyon	FAR	late 2000	Riparian Fencing
59C	Fresno Canyon to Bedrock Falls	PFC	late 2000	Riparian Fencing
59D	Bedrock Falls to Pump Canyon	PFC	1990	Riparian Fencing
59E	Pump Canyon to Cienega Falls	FAR	1990	Riparian Fencing
59F	Cienega Falls to Mattie Canyon	PFC	1990	Riparian Fencing
			1999	Develop upland water and close water gap
59G	Mattie Canyon to Cold Spring	PFC	1990	Riparian Fencing
			1999	Stream restoration upstream is returning flood flows
59H	Cold Spring to Agricultural Fields	FAR	1993	Stream restoration project
59I	Agricultural Fields to Canal	FAR	1999	Stream restoration project
59J	Canal to Oak tree Canyon	PFC	1995	Riparian Fencing
59K	Oak Tree to Spring Water Canyon	PFC	1995	Riparian Fencing
59L	Spring Water to Gardner Canyon	PFC	1995	Riparian Fencing
59M	Gardner to Head Waters	PFC	1995	Riparian Fencing

5. CHECKLIST OF BIRDS WITHIN THE EMPIRE-CIENEGA PLANNING AREA

Birds of the Empire-Cienega Planning Area

Common Name (FAMILY)	Species	Occurence
PODICIPEDIDAE		
Pied-billed Grebe	*Podilymbus podiceps*	Uncommon
PELICANIDAE		
Brown Pelican	*Pelicanus occidentalis*	Vagrant
ARDEIDAE		
Great Blue Heron	*Ardea herodias*	Uncommon
Great Egret	*Ardea albus*	Uncommon
Snowy Egret	*Egretta thula*	Uncommon migrant
Cattle Egret	*Bubulcus ibis*	Uncommon migrant
Green Heron	*Butorides virescens*	Uncommon migrant ?
Black-crowned Night-Heron	*Nycticorax nycticorax*	Uncommon migrant
THRESKIORNITHIDAE		
White-faced Ibis	*Plegadis chihi*	Uncommon migrant
ANATIDAE		
Greater White-fronted Goose	*Anser albifrons*	Rare migrant
**Mandarin Duck	*Aix galericulata*	Exotic species**
Green-winged Teal	*Anas crecca*	Common migrant and wintering species
Mallard	*Anas platyrhynchos*	Uncommon migrant and wintering species
Mexican Duck	*Anas platyrhynchos diazi*	Breeding?
Blue-winged Teal	*Anas discors*	Uncommon migrant
Cinnamon Teal	*Anas cyanoptera*	Uncommon migrant
American Wigeon	*Anas americana*	Uncommon migrant or wintering species
Gadwall	*Anas strepera*	Uncommon migrant or wintering species
Ring-necked Duck	*Aythya collaris*	Uncommon migrant or winter visitor to ponds
Bufflehead	*Bucephala albeola*	Uncommon migrant
Hooded Merganser	*Lophodytes cucullatus*	Uncommon or rare migrant
CATHARTIDAE		
Turkey Vulture	*Cathartes aura*	Common summer visitor
ACCIPITRIDAE		
Osprey	*Pandion haliaetus*	Uncommon migrant
White-tailed Kite	*Elanus leucurus*	Rare resident species
Bald Eagle	*Haliaeetus leucocephalus*	Rare migrant or winter species
Northern Harrier	*Circus cyaneus*	Common wintering species
Sharp-shinned Hawk	*Accipiter striatus*	Uncommon migrant and wintering species
Cooper's Hawk	*Accipiter cooperii*	Uncommon resident species
Northern Goshawk	*Accipiter gentilis*	Accidental
Harris' Hawk	*Parabuteo uncinctus*	Accidental
Gray Hawk	*Buteo nitidus*	Uncommon summer
Swainson's Hawk	*Buteo swainsoni*	Uncommon summer
Zone-tailed Hawk	*Buteo albonotatus*	Uncommon summer
Red-tailed Hawk	*Buteo jamaicensis*	Common resident specie
Ferruginous Hawk	*Buteo regalis*	Rare winter
Golden Eagle	*Aquila chrysaetos*	Uncommon visitor

Birds of the Empire-Cienega Planning Area, continued

Common Name (FAMILY)	Species	Occurence
FALCONIDAE		
American Kestrel	*Falco sparverius*	Common resident species
Merlin	*Falco columbarius*	Uncommon migrant and wintering species
Peregrine Falcon	*Falco peregrinus*	Uncommon migrant
Prairie Falcon	*Falco mexicanus*	Uncommon resident
PHASIANIDAE		
Montezuma Quail	*Cyrtonyx montezumae*	Uncommon resident
Scaled Quail	*Callipepla squamata*	Fairly common resident
Gambel's Quail	*Callipepla gambelii*	Common resident
RALLIDAE		
Virginia Rail	*Rallus limicola*	Uncommon resident species
Sora	*Porzana carolina*	Rare in winter
Common Moorhen	*Gallinula chloropus*	Rare migrant?
American Coot	*Fulica americana*	Uncommon migrant and wintering species
CHARADRIDAE		
Killdeer	*Charadrius vociferus*	Fairly common breeding species
SCOLOPACIDAE		
Solitary Sandpiper	*Tringa solitaria*	Uncommon fall migrant (rare in spring?)
Western Sandpiper	*Calidris mauri*	Uncommon fall migrant
Common Snipe	*Gallinago gallinago*	Uncommon winter resident
Wilson's Phalarope	*Phalaropus tricolor*	Uncommon fall migrant
CUCULIDAE		
Yellow-billed Cuckoo	*Coccyzus americanus*	Uncommon nesting species
Greater Roadrunner	*Geococcyx californianus*	Uncommon resident species
COLUMBIDAE		
Rock Dove	*Columba livia*	Uncommon resident?
White-winged Dove	*Zenaida asiatica*	Common summer resident
Mourning Dove	*Zenaida macroura*	Common resident
Inca Dove	*Columbina inca*	Uncommon resident
Common Ground-Dove	*Columbigallina passerina*	Uncommon irregular resident
TYTONIDAE		
Barn Owl	*Tyto alba*	Uncommon resident
STRIDGIDAE		
Western Screech-Owl	*Otus kennicottii*	Uncommon resident species
Flammulated Owl	*Otus flammeolus*	Hypothetical
Great Horned Owl	*Bubo virginianus*	Common resident
Ferruginous Pygmy Owl	*Glaucidium brasilianum*	Hypothetical
Elf Owl	*Micrathene whitneyi*	Uncommon nesting species
Burrowing Owl	*Speotyto cunicularia*	Uncommon nesting species
CAPRIMULGIDAE		
Lesser Nighthawk	*Chordeiles acutipennis*	Uncommon nesting species
Common Nighthawk	*Chordeiles minor*	Uncommon summer visitor
Common Poorwill	*Phalaenoptilus nuttallii*	Uncommon breeding species
APODIDAE		
Vaux's Swift	*Chaetura vauxi*	Uncommon fall migrant
White-throated Swift	*Aeronautes saxatalis*	Uncommon year-round visitor

Birds of the Empire-Cienega Planning Area, continued

Common Name (FAMILY)	Species	Occurence
TROCHILIDAE		
Broad-billed Hummingbird	*Cyanthus latirostris*	Post-breeding visitor
Plain-capped Starthroat	*Heliomaster constantii*	Rare visitor
Black-chinned Hummingbird	*Archilochus alexandri*	Fairly common summer
Anna's Hummingbird	*Calypte anna*	Uncommon migrant and possible breeding species
Costa's Hummingbird	*Calypte costae*	Uncommon migrant
Calliope Hummingbird	*Stellula calliope*	Uncommon migrant
Broad-tailed Hummingbird	*Selasphorus platycercus*	Uncommon migrant
Rufous Hummingbird	*Selasphorus rufus*	Fairly common migrant
TROGONIDAE		
Elegant Trogon	*Trogon elegans*	Accidental
ALCIDINIDAE		
Belted Kingfisher	*Ceryle alcyon*	Uncommon migrant and winter resident
Green Kingfisher	*Chloroceryl americana*	Rare visitor
PICIDAE		
Acorn Woodpecker	*Melanerpes formicivorus*	Fairly common resident
Gila Woodpecker	*Melanerpes uropygialis*	Common resident
Red-naped Sapsucker	*Sphyrapicus nuchalis*	Uncommon migrant and winter resident
Ladder-backed Woodpecker	*Picoides scalaris*	Common resident
Hairy Woodpecker	*Picoides villosus*	Accidental
Northern Flicker	*Colaptes auratus*	Red-shafted form is common resident
TYRANNIDAE		
Northern Beardless-Tyrannulet	*Camptostoma imberbe*	Uncommon breeding species
Olive-sided Flycatcher	*Contopus borealis*	Uncommon migrant
Western Wood-Pewee	*Contopus sordidulu*	Uncommon nesting species
Willow Flycatcher	*Empidonax traillii*	Uncommon migrant
Hammond's Flycatcher	*Empidonax hammondii*	Uncommon migrant and winter resident
Dusky Flycatcher	*Empidonax oberholseri*	Uncommon migrant and winter resident
Gray Flycatcher	*Empidonax wrightii*	Uncommon migrant and winter resident
Western Flycatcher		
Pacific-slope Flycatcher	*Empidonax difficilis*	Uncommon migrant
Cordilleran Flycatcher	*Empidonax occidentalis*	Uncommon migrant
Black Phoebe	*Sayornis nigricans*	Common nesting species
Eastern Phoebe	*Sayornis phoebe*	Rare migrant and winter
Say's Phoebe	*Sayornis saya*	Common nesting species
Vermilion Flycatcher	*Pyrocephalus rubinus*	Common and conspicuous nesting species
Dusky-capped Flycatcher	*Myiarchus tuberculifer*	Uncommon migrant
Ash-throated Flycatcher	*Myiarchus cinerascen*	Common nesting species
Brown-crested Flycatcher	*Myiarchus tyrannulus*	Uncommon nesting species
Tropical Kingbird	*Tyrannus melancholicus*	Hypothetical
Cassin's Kingbird	*Tyrannus vociferans*	Common nesting species
Western Kingbird	*Tyrannus verticalis*	Common nesting species
Eastern Kingbird	*Tyrannus tyrannus*	Accidental visitor
ALAUDIDAE		
Horned Lark	*Eremophila alpestris*	Common nesting species

Birds of the Empire-Cienega Planning Area, continued

Common Name (FAMILY)	Species	Occurence
HIRUDINIDAE		
Purple Martin	*Progne subis*	Uncommon migrant
Tree Swallow	*Tachycineta bicolor*	Uncommon migrant
Violet-green Swallow	*Tachycineta thalassina*	Common migrant and summer visitor
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	Common breeding species
Bank Swallow	*Riparia riparia*	Uncommon migrant
Cliff Swallow	*Hirundo pyrrhonota*	Common nesting species
Barn Swallow	*Hirundo rustica*	Common nesting species
CORVIDAE		
Steller's Jay	*Cyanocitta stelleri*	Rare winter visitor
Scrub Jay	*Aphelocoma califonica*	Rare visitor
Mexican Jay	*Aphelocoma ultramarina*	Uncommon resident
Chihuahuan Raven	*Corvus cryptoleucus*	Uncommon resident
Common Raven	*Corvus corax*	Uncommon resident
PARIDAE		
Bridled Titmouse	*Parus wollweberi*	Uncommon resident
REMIZIDAE		
Verdin	*Auriparus flaviceps*	Uncommon resident
AEGITHALIDAE		
Bushtit	*Psaltriparus minimus*	Uncommon resident
SITTIDAE		
White-breasted Nuthatch	*Sitta carolinensis*	Uncommon resident
CERTHIIDAE		
Brown Creeper	*Certhia americana*	Uncommon resident
TROGLODYTIDAE		
Cactus Wren	*Campylorhynchus*	Common resident
Rock Wren	*Brunneicapillum*	Uncommon resident
Canyon Wren	*Salpinctes obsoletus*	Uncommon resident
Bewick's Wren	*Catherpes mexicanus*	Common resident
House Wren	*Thryomanes bewickii*	Common migrant, uncommon winter
Winter Wren	*Troglodytes aedon*	Rare in winter
Marsh Wren	*Troglodytes troglodytes*	Uncommon migrant and winter
	Cistothorus palustris	
MUSICAPIDAE		
Blue-gray Gnatcatcher	*Polioptila caerulea*	Uncommon migrant
Black-tailed Gnatcatcher	*Poiloptila melanura*	Uncommon resident
Ruby-crowned Kinglet	*Regulus calendula*	Common winter
Western Bluebird	*Sialia mexicana*	Rare or eruptive in winter
Mountain Bluebird	*Sialia currucoides*	Eruptive in winter
Townsend's Solitaire	*Myadestes townsendi*	Eruptive in winter and migration
Swainson's Thrush	*Catharus ustulatus*	Uncommon migrant
Hermit Thrush	*Catharus guttatus*	Uncommon migrant and winter
American Robin	*Turdus migratorius*	Uncommon visitor
MIMIDAE		
Northern Mockingbird	*Mimus polyglottos*	Common resident
Sage Thrasher	*Oreoscoptes montanus*	Uncommon winter
Curve-billed Thrasher	*Toxostoma curvirostre*	Common resident
Crissal Thrasher	*Toxostoma crissale*	Uncommon resident

Birds of the Empire-Cienega Planning Area, continued

Common Name (FAMILY)	Species	Occurence
MOTACILLIDAE		
American Pipit	*Anthus rubescens*	Uncommon
Sprague's Pipit	*Anthus spragueii*	Uncommon
PTILOGONATIDAE		
Phainopepla	*Phainopepla nitens*	Common permanent resident
BOMBYCILLIDAE		
Cedar Waxwing	*Bombycilla cedrorum*	Uncommon usually late winter through early summer
LANIIDAE		
Loggerhead Shrike	*Lanius lodovicianus*	Uncommon resident
Northern Shrike	*Lanius excubitor*	Accidental
STURNIDAE		
European Starling	*Sturnus vulgaris*	Common resident
VIREONIDAE		
Bell's Vireo	*Vireo bellii*	Uncommon summer
Gray Vireo	*Vireo vicinior*	Hypothetical
Solitary Vireo	*Vireo solitarius*	Uncommon migrant
Hutton's Vireo	*Vireo huttoni*	Uncommon visitor
Warbling Vireo	*Vireo gilvus*	Common migrant
EMBERIZIDAE		
Tennessee Warbler	*Vermivora peregrina*	Accidental
Orange-crowned Warbler	*Vermivora celata*	Uncommon migrant
Nashville Warbler	*Vermivora ruficapilla*	Uncommon migrant
Virginia's Warbler	*Vermivora virginiae*	Uncommon migrant
Lucy's Warbler	*Vermivora luciae*	Common summer
Yellow Warbler	*Dendroica petechia*	Common summer
Yellow-rumped Warbler	*Dendroica coronata*	Common winter and migrant
Black-throated Gray Warbler	*Dendroica nigrescens*	Uncommon migrant
Townsend's Warbler	*Dendroica townsendi*	Uncommon migrant
Hermit Warbler	*Dendroica occidentalis*	Uncommon migrant
American Redstart	*Setophaga ruticilla*	Rare migrant
Northern Waterthrush	*Seiurus novemboracensis*	Uncommon migrant
Common Yellowthroat	*Geothlypis trichas*	Common summer, uncommon winter
MacGillivray's Warbler	*Opornis tolmiei*	Uncommon migrant
Hooded Warbler	*Wilsonia citrina*	Rare migrant
Wilson's Warbler	*Wilsonia pusilla*	Common migrant
Painted Redstart	*Myioborus pictus*	Rare visitor
Yellow-breasted Chat	*Icteria virens*	Common summer
Hepatic Tanager	*Piranga flava*	Rare migrant
Summer Tanager	*Piranga rubra*	Common summer
Western Tanager	*Piranga ludoviciana*	Common migrant
Northern Cardinal	*Cardinalis cardinalis*	Uncommon resident
Pyrrhuloxia	*Cardinalis sinuatus*	Uncommon resident
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	Rare migrant
Black-headed Grosbeak	*Pheucticus melanocephalus*	Common migrant
Blue Grosbeak	*Guiraca caerulea*	Common summer
Lazuli Bunting	*Passerina amoena*	Common migrant
Indigo Bunting	*Passerina cyanea*	Uncommon migrant or uncommon summer

Birds of the Empire-Cienega Planning Area, continued

Common Name (FAMILY)	Species	Occurence
EMBERIZIDAE		
Varied Bunting	*Passerina versicolor*	Uncommon summer
Painted Bunting	*Passerina ciris*	Rare migrant
Dickcissel	*Spiza americana*	Rare migrant
Green-tailed Towhee	*Pipilo chlorurus*	Common migrant and winter
Spotted Towhee	*Pipilo maculatus*	Uncommon winter
Canyon Towhee	*Pipilo fuscus*	Common resident
Abert's Towhee	*Pipilo aberti*	Common resident
Botteri's Sparrow	*Aimophila botterii*	Uncommon summer
Cassin's Sparrow	*Aimophila cassinii*	Uncommon summer/A few in winter
Rufous-winged Sparrow	*Aimophila carpalis*	Irregular resident
Rufous-crowned Sparrow	*Aimophila ruficeps*	Uncommon resident
Chipping Sparrow	*Spizella passerina*	Common winter
Brewer's Sparrow	*Spizella breweri*	Common winter
Vesper Sparrow	*Pooecetes gramineus*	Common winter
Lark Bunting	*Calamospiza melanocorys*	Uncommon winter/Eruptive
Lark Sparrow	*Chondestes grammacus*	Uncommon resident
Black-throated Sparrow	*Amphispisa bilineata*	Uncommon resident
Savannah Sparrow	*Passerculus sandwichensis*	Uncommon winter
Baird's Sparrow	*Ammodramus bairdii*	Uncommon winter
Grasshopper Sparrow	*Ammodramus savannarum*	Uncommon summer and uncommon winter
Song Sparrow	*Melospiza melodia*	Uncommon resident
Lincoln's Sparrow	*Melospiza lincolnii*	Common winter
Swamp Sparrow	*Melospiza georgiana*	Rare in winter
White-crowned Sparrow	*Zonotrichia leucophrys*	Common winter
Dark-eyed Junco	*Junco hyemalis*	Uncommon winter
McCown's Longspur	*Calcarius mccownii*	Rare in winter
Chestnut-collared Longspur	*Calcarius ornatus*	Uncommon in winter
Bobolink	*Dolichonyx oryzivorus*	Rare migrant
Red-winged Blackbird	*Agelaius phoeniceus*	Uncommon resident
Eastern Meadowlark	*Sturnella magna*	Common resident
Western Meadowlark	*Sturnella neglecta*	Uncommon winter
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*	Uncommon summer
Brewer's Blackbird	*Euphagus cyanocephalus*	Uncommon winter
Great-tailed Grackle	*Quiscalus mexicanus*	Uncommon visitor in spring
Bronzed Cowbird	*Molothrus aeneus*	Uncommon summer
Brown-headed Cowbird	*Molothrus ater*	Common summer
Hooded Oriole	*Icterus cucullatus*	Uncommon summer
Streak-backed Oriole	*Icterus pustulatus*	Accidental
Bullock's Oriole	*Icterus bullockii*	Uncommon summer
Scott's Oriole	*Icterus parisorum*	Uncommon summer
FRINGILLIDAE		
House Finch	*Carpodacus mexicanus*	Common resident
Pine Siskin	*Carduelis pinus*	Uncommon winter
Lesser Goldfinch	*Carduelis psaltria*	Common resident
Lawrence's Goldfinch	*Carduelis lawrencei*	Eruptive in fall and winter
American Goldfinch	*Carduelis tristis*	Uncommon in winter
PASSERIDAE		
House Sparrow	*Passer domesticus*	Common resident

Birds of the Empire-Cienega Planning Area, concluded

Abundance and Residence Categories:

Common: to be expected in proper habitat. Should be encountered on most visits during proper season.

Uncommon: may or may not be encountered. Includes species that are present in low numbers and species that are present in some years but not in others.

Rare: includes species that occur some years and in very small numbers.

Accidental: includes species that have occurred only once and are not likely to occur again.

Hypothetical: includes species for which documentation is lacking or questionable.

Resident: occurs year-round.

Summer: a neotropical migrant. A species that breeds at the Empire Ranch but is absent during the winter.

Migrant: a species encountered during annual passage.

Winter: a species that breeds farther north and spends the winter in the planning area.

Irruptive: species such as corvids that occur outside their normal range or habitat in response to resource fluctuations.

Irregular: a species that uses a site without an established pattern.

6. MAMMALS WITHIN THE EMPIRE-CIENEGA PLANNING AREA

Mammals of the Empire-Cienega Resource Conservation Area

Common Name (FAMILY)	Scientific Name (*Species*)	Source
SORICIDAE		
Desert Shrew	*Notiosorex crawfordi crawfordi*	3
PHYLLOSTOMIDAE		
Lesser long-nosed Bat	*Leptonycteris curasoae yerbabuenae*	1, 3
Mexican long-tongued bat	*Choeronycteris mexicana*	
VESPERTILIONIDAE		
Cave Myotis	*Myotis velifer brevis*	1,3
Fringes Myotis	*Myotis thysanodes thysanodes*	1,3
California Myotis	*Myotis californicus californicus*	1,3
Southwestern Myotis	*Myotis auriculus*	1
Western Pipistrelle	*Pipistrellus hesperus*	3
Big Brown Bat	*Eptesicus fuscus pallidus*	1,3
Red Bat	*Lasiurus borealis*	1
Hoary Bat	*Lasiurus cinereus*	1
Townsend's big-eared Bat	*Plecotus townsendii pallescens*	3
Pallid Bat	*Antrozous pallidus pallidus*	1,3
LEPORIDAE		
Desert Cottontail	*Sylvilagus auduboni arizonae*	1,3
Black-tailed Jackrabbit	*Lepus californicus eremicus*	1,3
Antelope Jackrabbit	*Lepus alleni*	1
SCIURIDAE		
Harris' Antelope Squirrel	*Ammospermophilus harrisii*	3
Rock Squirrel	*Spermophilus variegatus*	1,3
Spotted ground Squirrel	*Spermophilus spilosoma*	4
GEOMYIDAE		
Botta's Pocket Gopher	*Thomomys bottae proximus*	3
Southern Pocket Gopher	*Thomomys umbrinus*	2
HETEROMYIDAE		
Silky Pocket Mouse	*Perognathus flavus*	3
Bailey's Pocket Mouse	*Perognathus baileyi*	3
Hispid Pocket Mouse	*Perognathus hispidus*	3,4
Desert Pocket Mouse	*Perognathus penicillatus*	
Rock Pocket Mouse	*Perognathus intermedius*	3
Banner-tailed Kangaroo Rat	*Dipodomys spectabilis*	1,4
Merriam's Kangaroo Rat	*Dipodomys merriami*	3,4
Ord's Kangaroo Rat	*Dipodomys ordii*	3

Mammals of the Empire-Cienega Resource Conservation Area, continued

Common Name (FAMILY)	Scientific Name (*Species*)	Source
MURIDAE		
Plains Harvest Mouse	*Reithrodontomys montanus*	3
Western Harvest Mouse	*Reithrodontomys megalotis*	3
Fulvous Harvest Mouse	*Reithrodontomys fulvescens*	2,3
Cactus Mouse	*Peromyscus eremicus*	3
Deer Mouse	*Peromyscus maniculatus*	1,3
Brush Mouse	*Peromyscus boylii*	3
White-footed Mouse	*Peromyscus leucopus*	1
Northern Pygmy Mouse	*Baiomys taylori*	1,2,3
Northern Grasshopper	*Onychomys leucogaster*	3
Southern Grasshopper	*Onychomys torridus*	3
Hispid Cotton Rat	*Sigmodon hispidus*	3
Arizona Cotton	*Sigmodon arizonae*	1,4
Fulvous Cotton	*Sigmodon fulviventer*	3
Yellow-nosed cotton Rat	*Sigmodon ochrognathus*	2,3
Least Cotton Rat	*Sigmodon minimus*	5
White-throated Wood Rat	*Neotoma albigula*	1,3
ERETHRIZONTIDAE		
Porcupine	*Erethizon dorsatum*	1
CANIDAE		
Coyote	*Canis latrans*	1,3
Gray Fox	*Urocyon cinereoargenteus*	1,3
PROCYONIDAE		
Ringtail	*Bassariscus astutus*	1,3
Raccoon	*Procyon lotor*	1,3
Coati	*Nasua nasua*	1,3
MUSTELIDAE		
Badger	*Taxidea Taxus*	1
Striped Skunk	*Mephitis mephitis*	1,3
Hooded Skunk	*Mephitis macroura*	1
FELIDAE		
Mountain Lion	*Felis concolor*	1
Bobcat	*Felis rufus*	1,3
TAYASSUIDAE		
Collared Peccary (javelina)	*Tayassu tajacu*	1,3
CERVIDAE		
Mule Deer	*Odocoileus hemionus*	1,3
White-tailed Deer	*Odocoileus virginianus*	1,3
ANTILOCAPRIDAE		
Chihuahuan Pronghorn	*Antilocapra americana mexicana*	1,3

Mammals of the Empire-Cienega Resource Conservation Area, concluded

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Source:

1. BLM, Tucson Office Files (1988-89)
2. Arizona Game and Fish Department Nongame Heritage Database (1964-85)

C. Rosemont Inventory (1975-76): Davis, R. and Callahan, J.R., editors (ca. 1977). An Environmental Inventory of the Rosemont Area in Southern Arizona, Vol 1: the Present Environment. Unpublished contract reports to Anamax Mining Corp. 278p.

D. Anderson, J.E.(1982). Hunting area preferences of raptors in rangelands. Unpublished M.S. Thesis, University of Arizona, Tucson. 29p.

E. Bock, J.H., C.E. Bock, and J.R. McNight, 1976. A study of the effects of grassland fires at the research ranch in southeastern Arizona. Journal of the Arizona Academy of Science. Vol II: 49-57.

7. ANNOTATED CHECKLIST OF FISH, AMPHIBIANS, AND REPTILES WITHIN THE EMPIRE-CIENEGA PLANNING AREA

Fish, Amphibians, and Reptiles of the Empire-Cienega Resource Conservation Area

Common Name (FAMILY)	Scientific Name *(Species)*	Source
CYPRINIDAE		
Gila chub	*Gila intermedia*	1,2
Longfin dace	*Agosia chrysogaster*	1,2
Goldfish (Babocomari)	*Carassius auratus*	5
ICTALURIDAE		
Yellow bullhead ((Babocomari)	*Ameiurus natalis*	
POECILIIDAE		
Gila Topminnow	*Poeciliopsis occidentalis occidentalis*	1,2
Mosquitofish (Babocomari)		1
CENTRARCHIDAE		
Largemouth Bass (Babocomari)	*Micropterus salmoides*	4,5
Green Sunfish (Babocomari)	*Lepomis cyanellus*	5
Bluegill (Babocomari)	*Lepomis macrochirus*	5
PELOBATIDAE		
Couch's spadefoot	*Scaphiopus couchii*	1,3
Southern spadefoot	*Scaphiopus multiplicatus*	1
BUFONIDAE		
Sonoran Desert Toad	*Bufo alvarius*	3
Great Plain's Toad	*Bufo cognatus*	3
Red-spotted Toad	*Bufo punctatus*	3
RANIDAE		
Bullfrog	*Rana catesbeiana*	1
Lowland leopard frog	*Rana yavapaiensis*	1
Chiricahua leopard frog	*Rana chiricahuensis*	1
KINOSTERNIDAE		
Sonoran mud turtle	*Kinosternon sonoriense*	1
EMYDIDAE		
Desert Box turtle	*Terrapene ornata luteola*	1
IGUANIDAE		
Common collared lizard	*Crotaphytus collaris*	1,3
Lesser Earless lizard	*Holbrookia maculata*	1,3
Greater Earless lizard	*Holbrookia texana*	3
Clark's spiny lizard	*Sceloporus clarkii*	1,3
Tree lizard	*Urosaurus ornatus*	1,3
Short-horned lizard	*Phrynosoma douglassi*	3
Regal horned lizard	*Phrynosoma solare*	1,3

Fish, Amphibians, and Reptiles of the Empire-Cienega Resource Conservation Area, continued

Common Name (FAMILY)	Scientific Name *(Species)*	Source
SCINCIDAE		
Great Plains skink	*Eumeces obsoletus*	1
TEIIDAE		
Desert grassland whiptail	*Cnemidophorus uniparens*	1,3
Giant spotted whiptail	*Cnemidophorus burti*	3
Arizona desert whiptail	*Cnemidophorus tigris*	3
Sonoran spotted whiptail	*Cnemidophorus sonorae*	3
ANGUIDAE		
Madrean alligator lizard	*Gerrhonotus kingii*	1,3
HELODERMATIDAE		
Gila monster	*Heloderma suspectum*	1,3
COLUBRIDAE		
Ringneck snake	*Diadophis punctatus*	1,3
Big Bend Patch-nosed snake	*Salvadora hexalepis deserticola*	1,3
Sonoran whipsnake	*Masticophis bilineatus*	3
Coachwhip	*Masticophis flagellum*	3
Gopher snake	*Pituophis melanoleucus*	3
Green rat snake	*Elaphe triaspis*	2
Common kingsnake	*Lampropeltis getulus*	1
Checkered garter snake	*Thamnophis marcianus*	1
Mexican garter snake	*Thamnophis eques*	1
Black-necked garter snake	*Thamnophis cyrtopsis*	1,3
Chihuahuan hook-nosed snake	*Gyalopion canum*	2,3
Night snake	*Hypsiglena torquata*	3
Lyre snake	*Trimorphodon biscutatus*	3
Southwestern black-headed snake	*Tantilla hobartsmithi*	3
VIPERIDAE		
Western diamondback rattlesnake	*Crotalus atrox*	1
Mojave rattlesnake	*Crotalus scutulatus*	1,3
Rock rattlesnake	*Crotalus lepidus*	2
Black-tailed rattlesnake	*Crotalus molossus*	3

Sources:

1. BLM, Field Office Files
2. Arizona Game and Fish Heritage Database
3. Davis, R. and Callahan J.R., editors (N.D.) An environmental inventory of the Rosemont area in southern Arizona, Vol 1: The present environment unpublished contract report to Anamax Mining Corp. 278p.
4. Sheldon, D.L. and D.A. Hendrickson., 1988. Report of the October Fish Count. Arizona Game and Fish Department. Nongame Branch. Phoenix, Arizona 85023.
5. Minckley, W.L., 1985. Native fishes and natural aquatic habitats in U.S. Fish and Wildlife Service Region 2 west of Continental Divide. Report to U.S. Fish and Wildlife Service, Albuquerque, New Mexico, Department of Zoology, Arizona State University, Tempe, Arizona. 158p.

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8. WILLOW FLYCATCHER HABITAT ASSESSMENT AND SURVEYS

Southwestern Willow Flycatcher Habitat Classification 2000 Summaries for Cienega Creek* and Tributaries**

Segment				**Classification**	**Patch Size**	**Attributes**				
Number	**Location**	**Date (2000)**	**Length**	**S;P;N**[1]	**Acres**	**H**[2]	**W**[3]	**C.D.**[4]	**U.D.**[5]	**P.S.**[6]
59AA	Bootlegger to Narrows	7/12	1.5mi	P		S	P	P	S	P
59A	Narrows to Apache Canyon	7/12	.3	S		S	S	S	S	S
59B	Apache to Fresno Canyon	7/12	.3	S		S	S	S	S	S
59C	Fresno Canyon to Bedrock Falls	7/12	1.6	S		S	S	S	S	S
59E	Pump Canyon to Cienega Falls	7/11	.6	P		S	S	S	P	S
59F	Cienega Falls to Mattie Canyon	7/11	.5	P		S	S	S	P	S
59G	Mattie Canyon to Cold Springs	7/11	.5	p		S	S	S	P	S
59H	Cold Springs to Ag. Fields	7/11	1.0	P		S	S	S	P	S
59I	Ag. Fields to Canal	7/11	1.7	P		S	S	S	P	S
59J	Canal to Oak Tree Canyon	7/11	.9	S		S	S	S	S	S
59K	Oak Tree Canyon to Spring Water Canyon	7/11	.3	P	1500ft^2	S	S	S	P	S
59L	Spring Water Canyon to Gardner Canyon	7/11	1.0	S		S	S	S	S	S
59M	Gardner Canyon to Head Waters	7/11	1.3	P		S	S	S	P	S
62A	Empire Gulch Confluence	7/11	1.0	P		S	S	P	P	S
62D	Empire Gulch Spring-down stream	7/11	1.3	P		S	S	S	P	S

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* 59AA-59M

** 62A;62D

1. S - Suitable; P - Potential; N - Not SWIFL Habitat
2. Height
3. Width
4. Canopy Density
5. Understory Density
6. Patch Size

Willow Flycatcher Survey Results (1994-2000) Cienega Creek

Stream Reach	**Birds Detected? (Y/N)**	**Year Surveyed**
Mattie Canyon to Cold Water Spring (59G)	No	1994
Ag. Fields to Canal (59I)	No (all years)	1994, 1998, 1999, 2000
Canal to Oak Tree Canyon (59J)	No	1994
Oak Tree Canyon to Spring Water Canyon (59K)	No	1994
Gardner to Head Waters (59M)	No	1994

9. SPECIAL STATUS SPECIES SUMMARIES

Note: Descriptions of federally listed and candidate species can be found in Chapter 3.

Proposed Wildlife of Special Concern

Mexican garter snake (*Thamnophis eques*) - This species occupies perennial streams and permanent marshes at mid-elevations in central, south-central, and southeastern Arizona. It feeds primarily on fish and amphibians. Threats include predation by introduced exotics such as bullfrogs and habitat loss and degradation (AGFD 1996). There is suitable habitat along Cienega Creek. Mexican garter snakes occur along Cienega Creek and in tributaries in the planning area (BLM files). A priority vulnerable species in Sonoran Desert Conservation Plan (Pima County 2000).

Bunch grass lizard (*Sceloporus scalaris*) - This species is found in oak woodland, canyons, and montane forests of southeastern Arizona. Occasionally it is found in low-elevation grasslands. It frequents habitats with bunch grass. Threats include overgrazing of bunch grass habitat (AGFD 1996). This species is a likely inhabitant of grasslands above 4,000 feet within the planning area. It has been found at higher elevations in the Whetstone Mountains adjacent to the planning area (Turner and others 1999).

Lowland leopard frog (*Rana yavapaiensis*) - Occurs below 5500 feet elevation, south and west of Mogollon Rim in Arizona. This species occupies permanent waters, apparently preferring streams over ponds and other aquatic habitats. It has disappeared from most of lower Gila and lower Colorado river systems, and declines have also occurred in south central and southeastern Arizona. Threats include predation by non-native species such as bullfrogs, loss and degradation of habitats, and human uses of habitats (AGFD 1996). The planning area has suitable habitat along Cienega Creek and its tributaries. Lowland leopard frogs are present along Cienega Creek and at off-channel ponds in the floodplain (BLM files). A priority vulnerable species in Sonoran Desert Conservation Plan (Pima County 2000).

Azure bluebird (*Sialia sialis fulva*) - This is a Mexican sub-species of the Eastern bluebird. It occupies pine-oak forests of southeastern Arizona at elevations of 3280-6560 ft (Latta and others 1999). Azure bluebirds primarily utilize oaks including Emory, Arizona white, silverleaf and Mexican Blue oak tree species. They are frequently found in forest edges, areas with open canopy and scattered trees, as well as burned or cut woodland. They are a second cavity nester and utilize areas with high snag densities. Birds forage and nest in mature to late succession forest patches. Azure bluebirds are usually found in the mountains but have been documented at lower elevations in Patagonia, nesting in cottonwoods. In winter small flocks can wander and can sometimes be found in Tucson (Latta and others 1999). Threats include fuelwood harvesting and loss or degradation of higher elevation riparian habitats (AGFD 1996). During winter, there is the potential for flocks to travel onto the planning area from the Whetstone mountains.

Western yellow-billed cuckoo (*Coccyzus americanus occidentalis*) - This species is found in low elevation riparian areas with highest densities associated with cottonwood/willow communities with a canopy greater than 40 feet (Latta and others 1999). Potentially, they may utilize thick areas of mesquite bosque habitat. It feeds on beetles, grasshoppers, crickets, cicadas, and caterpillars. Threats include loss or degradation of native riparian habitat (AGFD 1996). Suitable habitat occurs along Cienega Creek in the planning area, and yellow-billed cuckoos are present. A priority vulnerable species in Sonoran Desert Conservation Plan (Pima County 2000).

Ferruginous hawk (*Buteo regalis*) - This species is found in high elevation grasslands and breeds in northern Arizona grasslands. Nests in juniper, rock outcrops or on open ground. In Arizona they can be found in open scrublands and woodlands, grasslands, semi-desert grasslands and agricultural areas in winter or during migration (Latta and others 1999). Threats include prairie dog control programs, human disturbance near nests, and urban expansion into grasslands (AGFD 1996). The Ferruginous hawk is an occasional visitor to the planning area where it forages in grassland habitats.

Northern Goshawk (*Accipter gentilis atricapillus*) - In the southwest this species is found primarily in ponderosa pine and mixed conifer forests. Studies in Arizona showed that adults tend to winter in ponderosa pine and pinyon-juniper forests. Nests predominately in mature stands of coniferous forests in northern, north-central, and eastern Arizona. Threats include loss and/or modification of nesting habitat due to timber management and wildfires (AGFD 1996). There is potential for occasional vagrant visits to the planning area.

Swainson's Hawk (*Buteo swainsoni*) - This species thrives in open grassland or open agricultural areas with scattered tall trees or trees along riparian habitat for nesting and roosting (Latta and others 1999). In Arizona, breeds primarily in the southeastern and northwestern grasslands. In southeastern grasslands, nests have been found in mesquite, soaptree yucca, cottonwood, and western soaptree.IT feeds primarily on insects and small mammals. Migrates the farthest of all North American hawks, traveling as far south as Argentina. Threats include pesticide use in South America, loss of nesting sites due to brush clearing and possible loss of foraging habitat due to grassland conversion (AGFD 1996). The planning area provides suitable habitat for Swainson's hawk and nesting has been documented (BLM files). A priority vulnerable species in Sonoran Desert Conservation Plan (Pima County 2000).

Green Kingfisher (*Chloroceryle americana*) - A locally rare resident, nesting along San Pedro River and Sonoita Creek. Nesting documented from mid-May to mid-July. This species prefers small shady perennial streams that provide roosts over the water (Phillips and others 1964). Threats include degradation and loss of native riparian habitat (AGFD 1996). The planning area provides suitable habitat and this species is a rare to common visitor.

Sprague's pipit *(Anthus spraguei)* - This species winters mainly in desert grasslands of southeastern Arizona. It arrives on wintering grounds by mid-October and is usually gone by early April. It prefers grassland habitat with dense herbaceous vegetation and grassy agricultural fields. Threats include overgrazing (especially during drought years), shrub invasion, and urban development (AGFD 1996). The planning area provides suitable habitat and a wintering population is present.

Baird's sparrow (*Ammodramus bairdii*) - This species prefers non-grazed to lightly grazed short-grass and mid-grass habitat free of trees or shrubs for their wintering and breeding grounds. They prefer rolling hills for wintering ground. Light to moderate grazing is tolerated but heavy grazing can result in winter mortality due to loss of thermal cover. This species is most common in non-grazed areas and almost absent where grazing is more than moderate (Latta and others 1999). Threats include overgrazing grasslands (during drought years), shrub invasion and agricultural and urban development in southeastern Arizona (AGFD 1996). The planning area provides suitable habitat and wintering populations are present.

Arizona grasshopper sparrow (*Ammodramus savannarum ammolegus*) - The primary breeding range of this sub-species is restricted to southeastern Arizona and northern Sonora, Mexico. This species prefers un-grazed mid-height grasslands free of trees and shrubs (Latta and others 1999). Breeding is initiated with the onset of summer rains in July. Threats include urban, agricultural, and road development, overgrazing of grasslands (especially during drought years), and shrub invasion of grasslands (AGFD 1996). *A.s. ammodramus* is fairly common on lightly grazed pastures within the planning area.

Western red bat *(Lasiurus blossevillii)* - This species is found along waterways with broad-leafed deciduous riparian or woodland habitat present. In Arizona, primarily occurs along central and southeastern riparian corridors among walnut, sycamores, and cottonwoods at elevations from 2500 to 7000 feet. They roost singly or in small family groups (female and off-spring) among dense clumps of foliage with thick over-story and open under-story. Prey items include moths and flies, beetles, cicadas, crickets, and flying ants. Pups are born in late May to mid-June. Threats include loss of riparian and other broad-leaved decidous forests and woodlands (AGFD 1996).They are thought to be a summer resident only. Suitable habitat occurs along Cienega Creek in the planning area and Western red bat are present (BLM files). A priority vulnerable species in Sonoran Desert Conservation Plan (Pima County 2000).

Townsend's big-eared bat (*Plecotus townsendii*) - This species is found in variety of habitats including deserts, woodland and pine forests. In Arizona it is widespread but not common. It is rare in northeastern grasslands and southwestern desert habitats of Arizona. It utilizes open mines and caves as day roosts and may roost at night in abandoned buildings. Foraging occurs in uplands and over water and prey is almost entirely moths (AZ Wildlife Views 1993). It winters in cold caves, lava tubes and mines mostly in upland and mountain locations. Threats include human disturbance at major maternity roosts; renewed mining, and closure or sealing of abandoned mines used as roosts (AGFD 1996). Suitable foraging habitat is present within the planning area and Townsend's big-eared bats have been documented within the planning area. No maternity roosts or hibernacula are known within the planning area. A priority vulnerable species in Sonoran Desert Conservation Plan (Pima County 2000).

Black-tailed prairie dog (*Cynomys ludovicianus*) - Extirpated from Arizona. This species is found in open desert grasslands and formerly occurred in plains grasslands of southeastern Arizona. It commonly feeds on short-grass species including buffalo grass (*Buchloe dactyloides*) and blue gramma (*Bouteloua gracilis*) (Van Pelt 1999). This species has been extirpated from the planning area, but the area provides potentially suitable habitat and this species is being considered for reintroduction.

BLM Sensitive Species

Longfin dace (*Agosia chrysogaster*) - This species is found throughout the Gila River basin in Arizona and occupies a variety of habitats from clear, cool high-elevation brooks to small low-desert streams with a sand or gravel substrate (Minckley 1973). It is typically found below 5000 feet elevation. Longfin dace are omnivorous and opportunistic. The major threat to the species is loss of extensive areas of suitable habitat and specifically loss of small, sandy stream habitat (Pima County 2000). Longfin dace are present in Cienega Creek within the planning area (BLM files). A priority vulnerable species in Sonoran Desert Conservation Plan (Pima County 2000).

Texas horned lizard (*Phrynosoma cornutum*) - This species occurs from the Mississippi river region west to extreme southeast Arizona (Stebbins 1985). It inhabits arid and semi-arid open country with sparse plant growth. This species is found in semidesert grassland and plains grassland communities in southeastern Arizona. It eats chiefly ants but also takes beetles and grasshoppers. A Texas horned lizard was observed at the southeast corner of the Whetstone mountains (Turner and others 1999), and are also present in grassland northwest of the Whetstone mountains (Karen Simms, BLM biologist, personal communication).

Gray hawk (*Buteo nitidus*) - This species is found in wooded lowland streams in southeastern Arizona (Phillips and others 1964). Gray hawks arrive in nesting areas beginning in mid-March and depart for wintering areas in Mexico by mid-October. Nearly all gray hawk nesting areas in the United States are in Arizona, where about 55 pairs are known mainly from the San Pedro and Santa Cruz rivers. Gray hawks nest in cottonwood willow galleries adjacent to mesquite woodlands. Threats include recreational disturbance and habitat destruction or modification (Glinski and others 1988). The planning area provides suitable habitat and grey hawk populations are increasing (BLM files).

Western burrowing owl (*Athene cunicularia hypugaea*) - The subspecies occurring in Arizona is one of up to 18 subspecies ranging from southern Canada through South America (Pima County 2000). Burrowing owls occupy flat unplowed prairies, grasslands, deserts, dikes and farms with existing burrows made by prairie dogs, banner tailed kangaroo rats and other mammals (Phillips and others 1964) Threats include loss of habitat from urban development, reductions in nest sites from decreases in burrowing mammal populations and effects of insecticides or rodenticides (Pima County 2000). Suitable habitat is present in the planning area. Historically communities were common in the planning area but have decreased to occasional occurrences. A priority vulnerable species in Sonoran Desert Conservation Plan (Pima County 2000).

Loggerhead shrike (*Lanius ludovicianus*) - This species is found in open country with scattered trees, shrubs, low scrub, and deserts with adequate perching material including lookout posts and wires. It nests in bushes and trees (Phillips and others 1964). Suitable habitat is present in the planning area and this species is a common winter resident.

Southwestern cave myotis (*Myotis velifer brevis*) - This species is found in Arizona within desertscrub communities of creosote, brittlebush, paloverde and various cacti between 300 and 5000 feet elevation. Summer congregations occur mostly in caves, tunnels, bridges, mines and sometimes in buildings near water. Arizona populations spend the winter hibernating in caves above 6,000 feet and others travel to the highlands of Mexico (Hoffmeister 1986, Barbour and Davis 1969). Threats include disturbance by humans at roosts and closure of abandoned mines (AGFD 1993). Suitable foraging habitat is present within the planning area and presence of the species has been documented (BLM files). No maternity roosts or hibernacula are known within the planning area.

Fringed myotis (*Myotis thysanodes*) - This species is found in a variety of habitats including low deserts, grasslands, oak woodland, ponderosa pine and spruce-fir forests throughout western North America (Barbour and Davis 1969). It prefers oak woodland habitat but forages out into surrounding habitats. Day and night roost sites include open mines, caves and buildings. During the summer this species is widespread in Arizona except in the southwestern region. It winters in the northwest and southeast corners of Arizona (Hoffmeister 1986). Suitable foraging habitat is present in the planning area and presence of the species has been documented (BLM files). No maternity roosts or hibernacula are known within the planning area.

California leaf-nosed bat (*Macrotus californicus*) - This species is predominately found in southwestern Arizona in Sonoran and Mohave desertscrub, but is occasionally found in the Chihuahuan and Great Basin deserts (Hoffmeister 1986). Day roosts include mines and caves and night roosts include mines, bridges, open buildings, cellars and porches. California leaf-nosed bats remain active in the same area year round and unlike many bats do not hibernate or migrate. They primarily eat insects including grasshoppers, cicadas, beetles, butterflies, and caterpillars (Barbour and Davis 1969). Threats include human disturbance at roosts and closure of abandoned mines or buildings being used as roosts (AGFD 1993). Suitable foraging habitat is present in the planning area and presence of the species has been documented (BLM files). A priority vulnerable species in Sonoran Desert Conservation Plan (Pima County 2000).

Mexican long-tongued bat (*Choeronycteris mexicana*) - This species occurs in the United States only in southeastern Arizona and extreme southwestern New Mexico during the summer and early fall (Barbour and Davis 1969). In Arizona, it has been found from the Chiricahua mountains to the Santa Catalina mountains to the Baboquivari mountains. In Arizona, it is found generally in oak-pine habitats at 4,000-6,000 feet although it has been documented in saguaro-paloverde desertscrub (Hoffmeister 1986). Typical roost sites are open mines and caves and usually less than a dozen individuals are present in a roost. Agave nectar is a common component of it's diet . Within the roosts, Mexican long tongued bats are usually found in the dimly lighted zone near the entrance to a roost. Threats include human disturbance of roosts and habitat loss such as over harvest of agaves in Mexico (AGFD 1993). Suitable foraging habitat and roost sites are present within the planning area, and the species has been documented to occur within the planning area (BLM files). A priority vulnerable species in Sonoran Desert Conservation Plan (Pima County 2000).

10. SPLIT-ESTATE LANDS

Empire/Cienega Planning Area Split-Estate Lands*

T18S, R17E	
Sec. 5, lot 7, lot 13	76.83
Sec. 3, lots 1 - 8 incl., S½SE¼	303.85 *State*
Sec. 1, S½NW¼, lots 5 -9 incl.	176.33 *State*
Sec. 9	@250
Sec. 8, lots 1.2.3.5.6.7	222.17
Sec. 18, lots 3,4, SESW, SESESE, N½N½SE	@190
Sec. 17, lots 4,5,8, SE¼, S½SW¼, NESW, N½NWSW	369.45
Sec. 19, lots 1,2, E½NW¼, SESW, N½SE¼, SESE	317.99
T18S, R16E	
Sec. 24, lots 1 - 4 incl., NW¼, W½NE¼	348.00
T18 S, R18E	
Sec. 5, E½	320.00
T19S, R18E	
Sec. 23, N½NE¼, SENE	120.00
Sec. 15, SWSW	40.00
Sec. 22, E½W½	160.00
Sec. 25 E½	320.00
T20S, R17E	
Sec. 13, SE¼, E½SW¼	240.00
Sec. 24, NENE, NENW	80.00
T20S, R18E	
Sec. 10, S½SW¼	80.00
Sec. 12, SE¼	160.00
Sec. 13, NE¼	160.00
Sec. 14, NE¼, N½NW¼, SENW, N½SE¼, SESE, S½SW¼	480.00 *State*
Sec. 15, N½NE¼	80.00 *State*
Sec. 23, NE¼	160.00 *State*
Sec. 24, NW¼, N½SW¼	240.00 *State*
T20S, R19E	
Sec. 15, N½, N½S½	480.00
Sec. 20, NE¼, E½SW¼, W½SE¼	320.00
Sec. 21, NW¼	160.00
Sec. 29, E½NW¼, W½NE¼	160.00
TOTAL	**5,914.62**

*_State_ means State Trust Land surface, all others are private surface.

11. LIST OF SCIENTIFIC PLANT AND ANIMAL NAMES USED IN THIS DOCUMENT

Common Name	Scientific Name
PLANTS	
Trees	
Apache pine	*Pinus engelmannii*
Arizona black walnut	*Juglans major*
Arizona white oak	*Quercus arizonica*
Arizona rosewood	*Vauquelinia californica*
Chihuahuan pine	*Pinus leiophylla*
Douglas fir	*Pseudotsuga menziesii*
Emory oak	*Quercus emoryi*
Fremont's cottonwood	*Populus fremontii*
Goodding willow	*Salix gooddingii*
netleaf hackberry	*Celtis Reticulata*
mesquite	*Prosopis glandulosa*
Mexican blue oak	*Quercus oblongifolia*
Mexican pinyon	*Pinus cembroides*
silverleaf oak	*Quercus hypoleucoides*
velvet ash	*Fraxinus pennsylvanica*
Shrubs and Cactus	
beargrass	*Nolina* spp.
burroweed	*Isocoma tenuisecta*
century plant (agave)	*Agave* spp.
cholla	*Cholla* spp.
false mesquite	*Calliandra eriophylla*
fourwing saltbush	*Atriplex canescens*
manzanita	*Arctostaphylos* spp.
mountain mahogany	*Cercocarpus montanus var. glaber*
needle spined pineapple cactus	*Echinomastus [= Neolloydia] erectocentrus* var *erectocentrus*
ocotillo	*Fouquieria splendens*
Palmer agave	*Agave palmeri*
prickly pear	*Opuntia* spp.
range ratany	*Krameria parvifolia*
seepwillow	*Baccharis salicifolia*
shrubby buckwheat	*Eriogonum wrightii*
silktassel	*Garrya wrightii* Torr.
skunkbush	*Rhus trilobata*
snakeweed	*Gutierrezia sarothrae*

Common Name	Scientific Name
soaptree yucca	*Yucca elata*
turbinella oak	*Quercus turbinella*
yucca	*Yucca spp.*
whitethorn	*Acacia constricta*
Grasses and Grasslike Plants	
Arizona cottontop	*Trichachne californica*
alkali sacaton	*Sporobolus airoides*
big sacaton	*Sporobolus wrightii*
black grama	*Bouteloua eriopoda*
blue grama	*Bouteloua gracilis*
bullgrass	*Muhlenbergia emersleyi*
bulrushes	*Scirpus spp.*
bush muhly	*Muhlenbergia porteri*
cane beardgrass	*Andropogon barbinodis*
cane bluestem	*Bothriochloa barbinodis*
cattail	*Typha latifolia, Typha domingensis*
spiked crinkle awn	*Trachypogon spicatus*
deergrass	*Muhlenbergia rigens*
green sprangletop	*Leptochloa dubia*
hairy grama	*Bouteloua hirsuta*
lehmann lovegrass	*Eragrostis lehmanniana*
plains bristlegrass	*Setaria grisebachii*
plains lovegrass	*Eragrostis intermedia*
prairie junegrass	*Koeleria macrantha*
rushes	*Juncus* spp.
sedges	*Carex/Cyperus* spp.
sideoats gramma	*Bouteloua curtipendula*
slender grama	*Bouteloua filiformis*
spike rushes	*Eleocharis* spp.
sprucetop grama	*Bouteloua chondrosioides*
squirreltail	*Sitanion hystrix*
Texas little bluestem	*Schizachyrium cirratum*
Texas timothy	*Phleum pratense*
three-awns	*Aristida* spp.
tobosa	*Hilaria mutica*
vine mesquite grass	*Panicum obtusum*
wolftail	*Lycurus phleoides*
woolyspike balsamscale	*Elionurus barbiculmis*
Forbs	
Canelo lady tresses orchid	*Spiranthes delitescens*

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Common Name	Scientific Name
horned pond-weed	*Zannachellia palustris*
Huachuca golden aster	*Heterotheca rutteri*
Huachuca water umbel	*Lilaeopsis schaffneriana* ssp. *recurva*
penny-wort	*Hydrocotyle verticillata*
speedwell	*Veronica*
stonewort	*Chara spp.*
water parsnip	*Berula erecta*
yerba mansa	*Anemopsis californica*
ANIMALS	
Fish	
Gila Chub	*Gila intermedia*
Gila topminnow	*Poeciliopsis occidentalis*
Longfin dace	*Agosia chrysogaster*
Amphibians and Reptiles	
Bunch grass lizard	*Sceloporus scalaris*
Chiricahua leopard frog	*Rana chiricahuensis*
Great plains narrow-mouthed toad	*Gastrophyrne olivacea*
Green rat snake	*Elaphe subocularis*
Lowland leopard frog	*Rana yavapaiensis*
Mexican garter snake	*Thamnophis eques*
Sonoran Mud Turtle	*Kinosternon sonoriense*
Birds	
American redstart	*Setophaga ruticilla*
Arizona grasshopper sparrow	*Ammodramus savannarum ammolegus*
Azure bluebird	*Sialia sialis fulva*
Baird's sparrow	*Ammodramus bairdii*
Bald eagle	*Haliaeetus leucocephalus*
Belted kingfisher	*Ceryle alcyon*
Black-capped gnatcatcher	*Polioptila nigriceps*
Black-shouldered kite	*Elanus caeruleus*
Buff-breasted flycatcher	*Empidonax fulvifrons*
Ferruginous hawk	*Buteo regalis*
Great blue heron	*Ardea herodias*
Green kingfisher	*Chloroceryle americana*
Northern aplomado falcon	*Falco femoralis septentrionalis*
Northern goshawk	*Accipter gentilis*
Northern gray hawk	*Buteo nitidus maximus*
Osprey	*Pandion haliaetus*
Rose-throated becard	*Pachyramphus aglaiae*
Southwestern willow flycatcher	*Empidonax traillii extimus*

Common Name	Scientific Name
Sprague's pipit	*Anthus spragueii*
Swainson's hawk	*Buteo swainsoni*
Thick-billed kingbird	*Tyrannus crassirostris*
Tropical kingbird	*Tyrannus melancholicus*
Virginia rail	*Rallus limicola*
Western yellow-billed cuckoo	*Coccyzus americanus occidentalis*
Mammals	
Antelope jack rabbit	*Lepus alleni*
Black-tailed jack rabbit	*Lepus californicus eremicus*
Black-tailed prairie dog	*Cynomys ludovicianus*
Bobcat	*Felis rufus*
California leaf-nosed bat	*Macrotus californicus*
Chihuahuan pronghorn	*Antilocapra americana mexicana*
Coati	*Nasua nasua*
Cottontail rabbit	*Sylvilagus auduboni arizonae*
Coyote	*Canis latrans*
Gray fox	*Urocyon cinereoargenteus*
Greater western mastiff bat	*Eumops perotis californicus*
Grizzly bear	*Ursus artos*
Jaguar	*Felis onca*
Lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*
Mexican long-tongued bat	*Choeronycteris mexicana*
Mexican wolf	*Canis lupus baileyi*
Mountain lion	*Felis concolor*
Mule deer	*Odocoileus hemionus*
Porcupine	*Erethizon dorsatum*
Raccoon	*Procyon lotor*
Ringtail	*Bassariscus astutus*
Southwestern cave myotis	*Myotis velifer brevis*
Townsend's big-eared bat	*Plecotus townsendii*
Western red bat	*Lasiurus blossevillii*
White-tailed deer	*Odocoileus virginianus*

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APPENDIX 4

Cumulative Impact Assumptions

Management of Intermixed Lands

State Trust Lands

It is assumed that, in the short-term, the Arizona State Land Department will continue to manage State Trust lands in the watershed for short term/highest economic benefit including issuing leases/permits for mining, grazing, recreation, rights-of-ways and commercial purposes.

In the long term, it is assumed that the State Land Department would consider selling State Trust land in the watershed for development purposes (real estate/commercial).

At the time of preparation of this EIS, several initiatives were being proposed to amend the Arizona State Constitution to shift the emphasis on some State Trust lands to conservation use. Should such an initiative pass in the future, then some or all of the intermixed State Trust Lands in the planning area might be considered for this category in the long-term. Depending on the wording of the initiative, uses such as grazing and recreation might continue on these selected lands, but sale of land or issuance of commercial leases would be unlikely to occur.

BLM could purchase State Trust lands or conservation easements in the planning area if resources became available but could not acquire lands through exchange unless authorized by legislation amending the State Constitution.

Forest Service Lands

It is assumed that in the short and long term that the Forest Service will continue to manage land for multiple uses/sustained yield including grazing, mining, recreation, wildlife, etc. and that in the short-term, the Forest Service will continue to make minor land use adjustments to block up forest lands and reduce inholdings (Including additional lands going to private along the eastern Forest Boundary in the Santa Rita Mountains).

Over the long-term, the Forest Service may change some current management strategies to meet the goals/objectives developed by the Sonoita Valley Planning Partnership through Forest Plan Revision or Amendment.

Private Lands

It is assumed that in the short-term, surrounding private lands will be a mix of large ranches and smaller "ranchettes" (<40 acres).

In the long-term, economic/social pressures to sell off ranches for development would likely increase and higher density development would occur.

Growth management strategies developed by the Sonoita Crossroads Community Forum and other local-driven growth management and planning efforts may result in opportunities for preservation of open space and conservation of natural resources through strategies such as purchase of conservation easements and purchase of development rights.

BLM could acquire private lands or conservation easements in the planning area from willing sellers through donation, exchange, or purchase if resources became available.

APPENDIX 5
LAS CIENEGAS RMP MAILING LIST

Las Cienegas RMP Mailing List

First Name	**Last Name**	**Title**	**Organization**
		Elected Official - Federal	
J.D.	Hayworth	Congressman	
Jim	Kolbe	Congressman	
Jon	Kyl	Senator	
John	McCain	Senator	
Bob	Stump	Representative	
		Elected Official - Local	
City of Tucson			
Jerry	Anderson	Ward Three, Council Member	
Jose	Ibarra	Ward One, Council Member	
Steve	Leal	Ward Five, Council Member	
Fred	Ronstadt	Ward Six, Council Member	
Shirley	Scott	Ward Four, Council Member	
Robert	Walkup	Mayor	
Carol	West	Ward Two, Council Member	
Pima County - Board of Supervisors			
Sharon	Bronson	District 3, Vice Chair	
Ray	Carroll	District 4	
Ann	Day	District 1	
Dan	Eckstrom	District 2	
Raul	Grijalva	District 5, Chairman	
Santa Cruz County - Board of Supervisors			
Robert	Damon	District 2	
Ronald R.	Morris	District 3	
Roberto	Rojas	District 1	
Cochise County - Board of Supervisors			
Lois	Backe	Budget Officer	
Victoria	Christiansen	Secretary Senior	
Jody N.	Klein	County Administrator	
Maria G.	Marsh	Assistant to the Clerk	
Nadine M.	Parkhurst	Clerk of the Board	Cochise County

Las Cienegas RMP Mailing List, continued

First Name	Last Name	Title	Organization
		Elected Official - State	
Don	Aldridge	Representative	
Debra	Brimhall	Representative	
Jack	Brown	Senator	
Jim	Carruthers	Representative	
Harry	Clark	Representative	
Pat	Conner	Senator	
Franklin	Flake	Representative	
Joe	Hart	Representative	
Jane	Hull	Governor	
Sue	Lynch	Representative	
Bob	McLendon	Representative	
Rebecca	Rios	Representative	
Peter	Rios	Senator	
Carol	Springer	Senator	
John	Verkamp	Representative	
John	Wettaw	Senator	
		Government - Federal	
			Air Force Pentagon
			Directorate of Env. Qlty.
			Federal Highway Administration
			Kaibab Nat'l Forest
			Lake Mead Nat'l Recreation Area
			Mineral Mang. Service
			Natural Resource Conservation Service, USDA
			Nat'l Park Service
			U.S. Air Force 56 CES/CEVN
			U.S. Bureau of Indian Affairs (BIA)
			U.S. Bureau of Land Mgmt. (BLM)
			U.S. Bureau of Reclamation (BOR)
			U.S. Dept. of Agriculture (USDA)
			U.S. Dept. of Army, Corps of Eng
			U.S. Dept. of Army, Ft. Huachuca Wildlife
			U.S. Dept. of Energy
			U.S. Env. Protection Agency (EPA)
			U.S. Fish & Wildlife Service (USFWS)

Las Cienegas RMP Mailing List, continued

First Name	Last Name	Title	Organization
			U.S. Forest Service (USFS)
			Coronado Nat'l Forest
			Prescott Nat'l Forest
			Tonto Nat'l Forest
			Mesa R.D. Tonto Nat'l Forest
			U.S. Geological Survey (USGS)
			U.S. National Park Service
		Government - Local	
			Central AZ Assoc. of Gov.
			City of Sierra Vista
			City of Tucson
			Eastern AZ Counties Org.
			Park Recreation & Library Dept. of Tucson
			Pima Co. Dept. of Civil Works
			Pima Co. Dept. of Transptn.
			Pima Co. Devlp. Brd. & Visitor Ctr.
			Pima Co. District Library
			Pima Co. Economic Dev.
			Pima Co. Land Use Committee
			Pima Co. Recreation Service
			Pima Co. Parks & Recreation
			Pima Co. Sheriff's Mounted Posse
			Pima Co. Wastewater Mang.
			Santa Curz Co., Planning Dept.
			Southeastern AZ Gov. Org.
			SW Land Exchange Project
			Tucson Chamber of Com.
			Tucson Fire Dept.
			Tucson Library
			Tucson Police Dept.
		Government - State	
			ASU AZ Mineral Assn.
			ASU, Center for Env. Studies
			ASU Chapter of the Wildlife

Las Cienegas RMP Mailing List, continued

First Name	Last Name	Title	Organization
		Government - State	
			ASU-Dept. of Anthropology
			ASU-Dept. of Plant Biology
			ASU, Dept. of Zoology
			ASU, Office of Cultural Resource
			AZ Arch Council & State Museum
			AZ Commission of Indian Affairs
			AZ Dept. of Env. Quality (ADEQ)
			AZ Dept. of Water Resources (ADWR)
			AZ Game &Fish Dept. WM-HB
			AZ Geological Survey
			AZ State Clearinghouse
			AZ State Land Dept. (ASLD)
			State Land Commissioner
			AZ State Mine Inspector's Office
			AZ State Parks
			OHV Coordinator
			AZ Trail Coordinator
			AZ State Parks Board
			Central AZ Project
			GR & Canyon University
			Natural Resources
			NAU, Cline Library
			NAY, School of Forestry
			Northwestern University
			Office of Attorney General
			Olympic State Park
			Soil & Water Conservation
			U of A Administration 412
			U of A, College of Law
			U of A School o Renewable Nat. R
			UC Davis
			University of AZ (U of A)

Las Cienegas RMP Mailing List, continued

First Name	Last Name	Title	Organization
		Government - Tribal	
			Ak-Chin Indian Community Env.
			Broadway/Gap Charter-Western
			Ft. McDowell Mohave-Apache Indian Comm.
			Kaibab-Paiute Council
			Office of Hopi Lands, the Hopi Tribe
			Pascua Yaqui Tribe
			Salt River Pima-MCPA Indian Comm.
			San Carlos Apache Tribe
			Tohono O'odham Nation
			Yavapai-Apache Community
		Media	
			ANRN
			Associated Press
			AZ Daily Star
			AZ Daily Sun
			Arizonian Weekly Bulletin
			Bumpy Road News
			Copper Basin News
			Daily Dispatch
			Freelance Writer
			Green Valley News & Sun
			Lake Powell Chronicle
			Mesa Tribune
			Nogales International
			Phoenix Gazette
			Tucson Citizen
		Non-Government Organization	
			American Fisheries Society
			Amigos
			Audubon Society
			AZ Antelope Foundation
			AZ-Archaeological Society
			AZ Assoc. of 4-Wheel Drive Club
			AZ Cattle Growers Assn.

Las Cienegas RMP Mailing List, continued

First Name	Last Name	Title	Organization
Non-Government Organization			
			AZ Rough Riders
			AZ State Assn. Of 4-Wheel Drive
			AZ State Rifle
			AZ Trail Assoc.
			AZ Wilderness Coalition
			AZ Wildlife Federation
			AZ Wool Producers Assn.
			Bullhead 4 Wheelers
			Center for Biological Diversity
			Cochise Co. Rough Riders
			Colorado River
			Co. Line Riders
			Co. SPRVSRE Assn.
			Copper State 4-Wheel Drive Club
			Council for Sustainable Living
			Creepy Crawlers 4 Wheeler Drive
			Defenders of Wildlife
			SW Rep., Defenders of Wildlife
			Desert Fishes Council
			Friends of Animals
			Friends of AZ Rivers
			Friends of Pronatura
			Forest Guardians
			Fund for Animals
			Garrett 4 WDC/AWA4 WDC
			Glendale Hiking Club
			Greater AZ Bicycling Assn.
			Greater Phoenix Brittany Club
			Hassayampa River Preserve
			Huachuca Hiking Club
			Havasu 4-Wheelers
			Hualapai 4-Wheelers
			Imprinting Foundation
			Internat'l Sonoran Desert Alliance
			Int'l Soc. of Protection of Mustangs
			Lands Foundation
			Lions Internat'l. (AZ)
			Mesa 4-Wheelers

Las Cienegas RMP Mailing List, continued

First Name	Last Name	Title	Organization
			Minerals Exploration Coalition
			Mohave Prospectors Assn.
			Mohave Co. Trails Assn., Inc.
			Motorola Dust Devils 4-Wheelers
			NOHUCC/AUHUA
			North American Bear Society
			Oracle Trails Coalition
			Roadrunner 4-Wheelers
			Pebble Pickin Posse
			People for the West
			Pima NRCD
			Pima Trails Association
			Rio Salado Vizla Club
			Research Ranch
			Rincon Institute
			Sahuaro 4X4's Sahuaro Brittany Club
			Santa Cruz Cnty. Fair & Rodeo Assn.
			Sierra Club-Rincon Group
			Sky Island Alliance
			Superstition Area Land Trust
			Southern Arizona Guides & Outfitters
			So. AZ Wildlife Callers
			Sonoita Bird Dog Club
			Sonoran Institute
			Southern Arizona Hiking Club
			Southern AZ G-S Pointer Club
			State Land Interface & United Dir.
			The Nature Conservancy
			Arizona Chapter
			Ramsey Cyn Preserve
			Tucson Amateur Astronomy
			Tucson Audubon Society
			Tucson Orienteering Club
			Tucson Rod & Gun Club
			Tucson Saddle Club
			Verde Valley 4-Wheel Drive Club
			Walapai 4-Wheelers
			Whittell Wildlife Trust
			Wilderness Land Trust

First Name	Last Name	Title	Organization
			Wildlife Society-AZ Chapter
			Yarnell Senior Citizens Center
		Private	
			Asarco, Inc.
			Asarco-SW Mining Division
			Boyce Thompson Arboretum
			Chambers Group
			Crown C Ranch
			El Paso Natural Gas Co.
			Empire Ranch Prop Owners
			Empire Rita Ranch
			Empire Valley
			Fossil Energy
			Helvetia Ranch
			High Haven Ranch
			McGann & Associates, Inc.
			M & K Associates
			Oakdale Ranch
			Rosemont Asarco, Inc.
			R/W Agent, AEPCO
			Phoenix Zoo
			Santa Fe Ranch
			Santa Rita Abbey
			Singing Valley Ranch
			S-Lazy J
			SW Minerals Explor Assoc.
			West Diamond M Ranch
			Windmill Ranch
			Whitney Ranch
			Zeneca Specialties
		Private - Citizen	
Rena Ann	Abolt		
Rev. Mother Beverly	Aitken		
Norman	Ahl		
Carol	Anderson		
Marge	Anderson		
Molly	Anderson		

Las Cienegas RMP Mailing List, continued

First Name	Last Name	Title	Organization
Alma	Baker		
Berly	Baker		
Ken	Baker		
Michael	Baker		
Cecile & Sarah	Barches		
David	Barnes		
Becty	Barrios		
Mary	Bartol		
Stu	Bengson		
Kitty	Bennett		
Dave	Bertelson		
John & Kay	Berian		
Peter	Bidegon		
Milo	Blecha		
Steve	Bioce		
Clare	Bonnelli		
Bob & Mary	Borman		
John	Bourdeau		
Bill	Branan		
Jerry & Dikie	Brever		
Mette	Brogden		
Gary	Brown		
Gale W.	Bundrick		
Happ	Burnett		
Margie	Buyer		
Sherri	Buzzard		
Ann	Carr		
Vincent & Dee	Cattolica		
Wess	Chambers		
Bob	Chap		
Ben & Patty	Claridge		
Shel	Clark		

Las Cienegas RMP Mailing List, continued

First Name	Last Name	Title	Organization
		Private - Citizen	
Mark	Cleveland		
Meade	Clyne		
Walter & Nancy	Coble		
Diane	Collins		
Glen	Collins		
Jim & Midge	Cole		
Jerry	Coolidge		
Pete	Cowgill		
Leslie J.	Cox		
Genee	Davidson		
Bob	Deming		
James W.	Dettmer		
Bob	Dixon		
Lucille	Dixion		
Sandy	Deitering		
John & Barbara	Donaldson		
Mac & Billie	Donaldson		
Mark	Douglas		
Foster	Drummond		
James	Dunn		
Don	Dybus		
Arlene	Essig		
Mark	Exline		
Morris	Farr		
Julia	Fonseca		
Sidney H.	Franklin		
Brian	Friedman		
Chuck	Frost		
Velma	Furno		
Pat	Gallagher		
Peter	Galvin		
Bill & Sandi	Garbutt		
Dale	Gazzolo		
Stephanie	Gibert		
Kevin	Giddens		
Al	Glynn		
Keith	Graves		
Debbie	Greenside		

Las Cienegas RMP Mailing List, continued

First Name	Last Name	Title	Organization
Rachel	Grunefelder		
Ken & Ethel	Haber		
Brad	Haber		
Douglas	Hamilton		
Traci	Hamilton		
Jan	Hancock		
Diane & Neal	Hanna		
Beth	Hardy		
David	Harker		
Richard	Harris		
Williams	Haynes		
Cisney	Havatone		
Ralph	Higgs		
Leonard	Hines		
David	Hogan		
Don	Hogg		
David	Hoffman		
J. F. & P. D.	Hoffman		
John	Hoffman		
Mac	Hudson		
Gail	Hummel		
Hedi	Hummel		
Ron	Hummel		
Don	Irving		
David	Jacome		
Rukin	Jelks		
Peggy	Johnson		
Drexal	Jones		
Bob	Kamilli		
Walter & Evelyn	Karl		
Tim & Jonelle	Kearney		
Gary	Keller		
Gene & Jerry	Kindred		
Lou Anne	Kirby		
Jake	Kittle		
Doug	Koppinger		
Alexis	Kostich		
Don	Kucera		

Las Cienegas RMP Mailing List, continued

First Name	Last Name	Title	Organization
		Private - Citizen	
Ray	Kunde		
Jim	Lamb		
Tom	Lajoie		
Charles	LeFevre		
Lainie	Levick		
Cynthia	Lovely		
John & Cynthia	Lunine		
Wes & Marilyn	Manshall		
Bob & Darlene	Mansmith		
Ken	Marcus		
George	Masek Jr.		
Vicki	Mattox		
John	Maynard		
Joanne	Meyer		
Pam	Mickolowski		
Mark	Miller		
Michael & Dawn	Milroy		
Larry	Missal		
William	Mories		
Ann	Moote		
Austin	Moss		
Grandy	Montgomery		
Bob	McClain		
Michael	McGah		
Donald	McGann		
Ann	McGreevy		
Barbara	McReynolds		
Carlos	Nagel		
Evalyn	Newhaus		
Lee	Nellis		
James	Notestine		
Russ	Obrien		
Phil, Patrick & Brenda	Ogden		
Becky	Peterman		
Pete	Pfeifer		
Lon	Pierce		
Rosalee K.	Ponce		
Hec	Ramsey		

Las Cienegas RMP Mailing List, continued

First Name	Last Name	Title	Organization
		Private - Citizen	
Josh	Randall		
Aubrey & Luann	Raus		
Martin	Reff		
Leonard	Riechart		
Tom	Reininger		
Jim & Michey	Renfro		
Raymond	Rich		
Tom	Richter		
Robert	Rivers		
Bob & Joy	Rhinesmith		
Dot	Rhodes		
Bill	Rowekamo		
David	Ruben		
Steve	Saway		
Doug	Sawyer		
Mike	Schenk		
Jeff	Schmidt		
Justin	Schmidt		
Terry	Schwartz		
Cabot	Sedgwick		
Mike	Siedman		
Randy	Simmons		
Doug	Shough		
J. W.	Smith		
Lamar	Smith		
Michael	Smith		
Larry	Snead		
Doug	Snow		
L B	Solsberry		
Jay	Spehar		
Larry	Stallcup		
Doug	Sposito		
John	Startt		
John	Stephanson		
Lewis	Stickford		
Karen & Steve	Strom		
Julie	Stromberg		
Rex & Katie	Stump		

Las Cienegas RMP Mailing List, continued

First Name	Last Name	Title	Organization
		Private - Citizen	
John	Sullivan		
Van	Talley		
Kiyo	Taylor		
Rheal	Tetreault		
T. E.	Tiernay		
Kelly	Tighe		
Ron	Tiller		
Rachel	Thomas		
George	Trigaux		
Sharon	Urban		
Lowell	Van Dyke		
Dusty	Vail Ingram		
Sue Ann	Vannoz		
Mindy	Vaughan		
Robert	Veregara		
donna	Vettleson		
George	Volker		
Mike & Barbara	Wagoner		
David & S. M.	Walker		
Berb	Waters		
Frances	Werner		
Don	Wienstien		
William	Well II		
Betty J.	Wells		
Frank	Wilczek		
Jeff	Williamson		
Paul & Cheryl	Wilson		
Dennis & Mary	Whicker		
Volney	White		
Peter	Whitney		
Ann Marie	Wolf		
Stephen	Wood		
Beth	Wooden		
Barbara	Zook		

GLOSSARY

ABIOTIC: The nonliving, material (as opposed to conceptual) components of the environment, such as air, rocks, soil, water, coal, peat, and plant litter. Also see BIOTIC.

ACCELERATED SOIL EROSION: Soil loss above natural levels resulting directly from human activities. Because of the slow rate of soil formation, accelerated erosion can permanently reduce plant productivity.

ACQUIRED PUBLIC LANDS: Lands in federal ownership that the government obtained as a gift or by purchase, exchange, or condemnation.

ACRE-FOOT: A volume that covers an area of 1 acre to a depth of 1 foot (43,560 ft^3).

ACTIVE MANAGEMENT AREAS: Five areas in Arizona (Prescott, Phoenix, Pinal, Santa Cruz, and Tucson) where the Arizona Department of Water Resources regulates groundwater use. Groundwater regulations stem from the 1980 Arizona Groundwater Management Code, which provides the management framework to ensure dependable water supplies for Arizona well into the future. Ensuring dependable supplies, the code places conservation requirements on municipal and agricultural water use and promotes the use of renewable supplies, such as Colorado River water delivered by the Central Arizona Project.

ACTIVITY PLAN: A detailed and specific plan for managing a single resource program or plan element undertaken as needed to implement the more general resource management plan (RMP) decisions. BLM prepares activity plans for specific areas to reach specific resource management objectives within stated time frames.

ADAPTIVE REUSE: Repairing or remodeling a historic structure so that it can be used for purposes other than those for which it was originally built.

ADMINISTRATIVE USE OF MINERAL MATERIALS: BLM's use of mineral materials from public land for land management projects.

ADVANCED ECOLOGICAL STATUS: A condition that is considered to be achieved when the existing vegetation community on a defined ecological site has a high correlation to the potential natural community for that site (ecological site rating > 50). These conditions are determined from ecological site inventories using the Natural Resource Conservation Service (NRCS) ecological site guides to compare the existing vegetation communities on each ecological site to the potential plant community for that site. Achieving an advanced ecological status is assumed to be an expression of the physical and biological condition or degree of function needed to sustain a healthy rangeland ecosystem.

AGGREGATE: Uncrushed or crushed gravel, crushed stone or rock, sand, or artificially produced inorganic matter that forms the major part of concrete.

AIR QUALITY RATING: See CLASS I AIR QUALITY RATING and CLASS II AIR QUALITY RATING.

AIRSHED: The atmospheric zone potentially influenced by air pollutants from various sources.

ALLOTMENT: An area of one or more pastures where one or more operators graze their livestock.

An allotment generally consists of federal rangelands, but may include intermingled parcels of private, state, or federal lands. BLM stipulates the number of livestock and season of use for each allotment.

ALLOTMENT MANAGEMENT PLAN (AMP): A livestock grazing management plan dealing with a specific unit of rangeland and based on multiple use resource management objectives. The AMP considers livestock grazing in relation to other uses of rangelands and to renewable resources—watershed, vegetation, and wildlife. An AMP establishes the seasons of use, number of livestock to be permitted on rangelands, and the range improvements needed.

ALLUVIAL FAN: A low, outspread, relatively flat to gently sloping mass of sediment, shaped like an open fan and deposited by a stream where it flows from a narrow mountain valley onto a plain or broad valley.

ALLUVIUM: Any sediment deposited by flowing water, as in a riverbed, floodplain, or delta.

AMALGAMATION PAN: A circular, cast-iron pan in which gold or silver ore is ground and the precious metal particles are amalgamated when mercury is added.

ANIMAL UNIT: One mature (1,000 pound) cow or the equivalent based upon an average daily forage consumption of 26 pounds of dry matter per day.

ANIMAL UNIT MONTH (AUM): The amount of forage needed to sustain one cow, five sheep, or five goats for a month.

ANNUAL PLANT: A plant that completes its life cycle and dies in 1 year or less. Also see PERENNIAL PLANT.

APICAL MERISTEM: Area of undifferentiated plant tissue at the tip of the root or shoot from which new cells arise; growing point at the tip of the root or stem in vascular plants.

AQUATIC HABITATS: Habitats confined to streams, rivers, springs, lakes, ponds, reservoirs, and other water bodies.

AQUIFER: A water-bearing bed or layer of permeable rock, sand, or gravel capable of yielding large amounts of water.

AQUIFER RECHARGE: The adding of water to an aquifer, a process that occurs naturally from the infiltration of rainfall and from water flowing over earth materials that allow it to infiltrate below the land surface.

AREA OF CRITICAL ENVIRONMENTAL CONCERN (ACEC): A designated area on public lands where special management attention is required (1) to protect and prevent irreparable damage to fish and wildlife; to protect important historic, cultural, or scenic values; or other natural systems or processes or (2) to protect life and safety from natural hazards.

ARIZONA STANDARDS FOR RANGELAND HEALTH AND GUIDELINES FOR GRAZING ADMINISTRATION: Standards and guidelines developed collaboratively by BLM and the Arizona Resource Advisory Council (RAC) to address the minimum requirements of the Department of the Interior's final rule for Grazing Administration, effective August 21, 1995.

ASPECT: See VISUAL ASPECT.

AVAILABLE FORAGE: Forage that can be grazed and still allow sustained forage production on rangeland. Available forage may or may not be authorized for grazing.

BAJADA: A broad continuous slope extending along and from the base of a mountain range and formed by coalescing alluvial fans.

BAR: A ridgelike accumulation of sand, gravel, or other alluvial material formed in the channel, along the banks, or at the mouth of a stream where a decrease in velocity induces deposition. Also see WATER BAR.

BASE FLOW (DISCHARGE): The portion of stream discharge derived from such natural storage sources as groundwater, large lakes, and swamps but not derived from direct runoff or flow from stream regulation, water diversion, or other human activities.

BASE HERD: The constant livestock herd size that is continually licensed but may not be the same as the grazing (carrying) capacity. Also see GRAZING CAPACITY.

BASE LEVEL: The lowest level to which a land surface can be reduced by the action of running water.

BASE METAL: A metal inferior in value to gold and silver; a term generally applied to the commercial metals such as copper and lead.

BASIN (INTERMONTANE BASIN): A broad structural lowland between mountain ranges, commonly elongated and many miles across.

BIOLOGICAL ASSESSMENT: Information prepared by or under the direction of a federal agency to determine whether a proposed action is likely to (1) harm threatened or endangered species or designated critical habitat, (2) jeopardize the existence of species that are proposed for listing, or (3) adversely modify proposed critical habitat. Biological assessments must be prepared for major construction activities. The outcome of a biological assessment determines whether formal Section 7 consultation or a conference is needed. Also see BIOLOGICAL EVALUATION.

BIOLOGICAL DIVERSITY (BIODIVERSITY): The full range of variability within and among living organisms and the ecological complexes in which they occur. Biological diversity encompasses ecosystem or community diversity, species diversity, and genetic diversity.

BIOLOGICAL EVALUATION: The gathering and evaluation of information on proposed endangered and threatened species and critical and proposed critical habitat for actions that do not require a biological assessment. Also see BIOLOGICAL ASSESSMENT.

BIOLOGICAL OPINION: A document that includes the following: (1) the opinion of the U.S. Fish and Wildlife Service or the National Marine Fisheries Service as to whether a federal action is likely to jeopardize the existence of a species listed as threatened or endangered or destroy or adversely modify designated critical habitat, (2) a summary of the information on which the opinion is based, and (3) a detailed discussion of the effects of the action on listed species or designated critical habitat.

BIOLOGICAL PLANNING PROCESS: The process proposed by Alternative 2 of this plan and EIS, by which a Biological Planning Team would (1) determine the current health and trend of rangeland resources in the Empire-Cienega Planning Area, (2) evaluate proposed grazing and recreation actions in light of resource conditions and concerns and objectives of the Empire-Cienega Integrated Resource Management Plan, and (3) recommend to BLM annual authorizations for livestock grazing and changes to recreation authorizations or site uses.

BIOLOGICAL PLANNING TEAM: Under Alternative 2 of this plan and EIS, a team that would meet at least twice a year to (1) determine the current health and trend of rangeland resources in the Empire-Cienega Planning Area, (2) evaluate proposed grazing and recreation actions in light of resource conditions and concerns and objectives of the Empire-Cienega Integrated Resource Management Plan, and (3) recommend to BLM annual authorizations for livestock grazing and changes to recreation authorizations or site uses. The proposed Biological Planning Team would consist of a balance among resource managers, resource users, and people concerned about proper resource management.

BIOMASS: The total amount of living matter in a given unit of the environment.

BIOTIC: Pertaining to life or living; the living components of the environment. Also see ABIOTIC.

BLM SENSITIVE SPECIES: See SENSITIVE SPECIES.

BOSQUE: A woodland dominated by trees more than 15 feet tall.

BRAIDING: A pattern of an interlacing or tangled network of several branching and reuniting stream channels separated by branch islands or channel bars.

BROWSE: The part of leaf and twig growth of shrubs, woody vines, and trees available for animal consumption.

CANDIDATE SPECIES: Species not protected under the Endangered Species Act but being considered by the U.S. Fish and Wildlife Service for inclusion on the list of federally threatened and endangered species.

CANOPY: The cover or leaves of branches formed by the tops or crowns of plants as viewed from above the cover, measured by the vertical projection downward of the extent of the cover, and expressed as a percentage of the ground so covered.

CARBON-14 DATING: A method of estimating the age of an artifact containing carbon by measuring the radioactivity of its carbon-14 content to determine how long ago the specimen was separated from equilibrium with the atmosphere-plant-animal cycle. Continuously produced in the atmosphere by cosmic-ray bombardment, carbon-14 decays with a half-life typically described as 5,568 years. An object is dated by comparing its carbon-14 activity per unit mass with that in a contemporary sample.

CARRYING CAPACITY (WILDLIFE): The most animals a specific habitat or area can support without causing deterioration or degradation of that habitat. Also see GRAZING CAPACITY.

CASUAL USE (MINING): Mining that only negligibly disturbs federal lands and resources and does not include the use of mechanized earth moving equipment or explosives or motorized equipment in areas closed to off-highway vehicles. Casual use generally includes panning, nonmotorized sluicing, and collecting mineral specimens using hand tools.

CASUAL USE (RECREATION): Noncommercial or nonorganized group or individual activities on public land.

CASUAL USE OF MINERAL MATERIALS: Extracting mineral materials for limited personal (noncommercial) uses.

CATEGORICAL EXCLUSION: A category of federal actions that do not individually or cumulatively have a significant effect on the human environment and for which neither an environmental impact statement nor an environment assessment is required.

CATTLE YEAR-LONG (CYL): The amount of forage needed to sustain one cow for a 1-year period. One CYL equals 12 animal unit months (AUMs). Also see ANIMAL UNIT MONTH.

CERARGYRITE: Horn silver. Silver chloride (AgCl), which contains 75% silver.

CERUSSITE: A lead carbonate, $PbCO_3$.

CHAINING: A mechanical vegetation treatment in which two tractors drag an anchor chain extended between them over the terrain to uproot brush and small trees.

CHANNEL: A natural or artificial watercourse with a definite bed and banks to confine and conduct continuously or periodically flowing water.

CHANNEL MORPHOLOGY: The structure and form of a stream channel.

CIENEGA: A marshy or swampy area where the ground is wet due to the presence of seepage or springs.

CLASS I AIR QUALITY RATING: The rating given areas of the country that have been set aside under the Clean Air Act to receive the most stringent degree of air quality protection. Also see CLASS II AIR QUALITY RATING.

CLASS II AIR QUALITY RATING: Under the Clean Air Act the rating given areas of the country selected for somewhat less stringent protection from air pollution damage than Class I areas, except in specified cases. Also see CLASS I AIR QUALITY RATING.

CLIMAX: A plant community's final and highest ecological development, which emerges after a series of successive vegetational stages. The climax community perpetuates itself indefinitely unless disturbed by outside forces. Also see DISCLIMAX.

COLONIZATION: Occupation of an area by a group of organisms which previously did not occupy the area.

COMMUNITY: A collective term used to describe an assemblage of organisms living together; an association of living organisms having mutual relationships among themselves and with their environment and thus functioning at least to some degree as an ecological unit.

CONSERVATIVE STOCKING RATE: A stocking rate 15 to 25% below grazing capacity. Also see STOCKING RATE and GRAZING CAPACITY.

CONSERVATION EASEMENT: An easement to assure the permanent preservation of land in its natural state or in whatever degree of naturalness the land has when the easement is granted. Also see EASEMENT.

COOL-SEASON PLANTS: Plants whose major growth occurs during the late fall, winter, and early spring. Also see WARM-SEASON PLANTS.

COOPERATIVE MANAGEMENT AGREEMENT: A document that describes agreements made between BLM and the public on adjusting grazing use. This document also defines the specific adjustments and the schedule of adjustments (usually over a 5-year period).

CORRIDOR: See DESIGNATED CORRIDOR.

COVER: (1) Plants or plant parts, living or dead, on the surface of the ground. (2) Plants or objects

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used by wild animals for nesting, rearing of young, escape from predators, or protection from harmful environmental conditions.

COW-CALF LIVESTOCK OPERATION: A livestock operation that maintains a base breeding herd of mother cows and bulls. The cows produce a calf crop each year, and the operation keeps some heifer calves from each calf crop for breeding replacements. Between the ages of 6 and 12 months the operation sells the rest of the calf crop along with old and nonproductive cows and bulls.

CRETACEOUS: In geologic history the third and final period of the Mesozoic era, from 144 million to 65 million years ago, during which extensive marine chalk beds formed.

CRITICAL HABITAT, DESIGNATED: Specific parts of an area that are occupied by a federally listed threatened or endangered plant or animal at the time it is listed and that contain physical or biological features essential to the conservation of the species or that may require special management or protection. Critical habitat may also include specific areas outside an area occupied by a federally listed species if the Secretary of the Interior determines that these areas are essential for conserving the species.

CROSSING LANE: A fenced corridor that allows livestock to cross a stream without spreading out into the water.

CULTURAL RESOURCE (CULTURAL PROPERTY): A location of human activity, occupation, or use identifiable through field inventory, historical documentation, or oral evidence. Cultural resources include archaeological, historical, or architectural sites, structures, or places with important public and scientific use. Cultural resources may include definite locations of traditional cultural or religious importance to specified social or cultural groups.

CULTURAL RESOURCE DATA: Cultural resource information embodied in material remains and manifested in studies, notes, records, diaries, analyses, and published and unpublished manuscripts.

CULTURAL RESOURCE DATA RECOVERY: The professional application of archaeological techniques of controlled observation, collection, excavation, and/or removal of physical remains, including analysis, interpretation, explanation, and preservation of recovered remains and associated records in an appropriate curatorial facility, used as a means of protection. Data recovery may sometimes employ professional collection of such data as oral histories, genealogies, folklore, and related information to portray the social significance of the affected resources.

CULTURAL RESOURCE INVENTORY (SURVEY): A descriptive listing and documentation, including photographs and maps, of cultural resources. Included in an inventory are the processes of locating, identifying, and recording sites, structures, buildings, objects, and districts through library and archival research, information from persons knowledgeable about cultural resources, and on-the-ground surveys of varying intensity.

Class I: A professionally prepared study that compiles, analyzes, and synthesizes all available data on an area's cultural resources. Information sources for this study include published and unpublished documents, BLM inventory records, institutional site files, and state and National Register files. Class I inventories may have prehistoric, historic, and ethnological and sociological elements. These inventories are periodically updated to include new data from other studies and Class II and III inventories.

Class II: A professionally conducted, statistically based sample survey designed to describe the probable density, diversity, and distribution of cultural properties in a large area. This survey is achieved by projecting the results of an intensive survey carried out over limited parts of the target area. Within individual sample units, survey aims, methods, and intensities are the same as those applied in Class III inventories. To improve statistical reliability Class II inventories may be conducted in several phases with different sample designs.

Class III: A professionally conducted intensive survey of an entire target area aimed at locating and recording all visible cultural properties. In a Class III survey, trained observers commonly conduct systematic inspections by walking a series of close-interval parallel transects until they have thoroughly examined an area.

CULTURAL RESOURCE PROJECT PLAN: A detailed design plan for cultural resource projects such as structure stabilization, research efforts, interpretive development, and restrooms. These plans include estimates on workforce, equipment, and supply needs.

CUMULATIVE IMPACTS: Impacts that result from the incremental changes from all planned actions when added to other past, present, and reasonably foreseeable changes. Cumulative impacts can also result from individually minor, but collectively significant, actions taking place over time.

CYPRINID: Any of a family (Cyprinidae) of freshwater fishes that include the carps and minnows.

DATA RECOVERY: See CULTURAL RESOURCE DATA RECOVERY.

DECISION RECORD: A manager's decision on a categorical exclusion review or an environmental assessment. Comparable to the record of decision for an environmental impact statement, the decision record includes (1) a finding of no significant impact, (2) a decision to prepare an environmental impact statement, or (3) a decision not to proceed with a proposal. Also see RECORD OF DECISION.

DEFERRED ROTATION GRAZING: Moving grazing animals to various parts of a range in succeeding years or seasons to provide for seed production, plant vigor, and seedling growth.

DESIGNATED CORRIDOR: BLM's preferred route for placing rights-of-way for utilities (pipelines and powerlines) and transportation (highways and railroads).

DESIRED PLANT COMMUNITY: The plant community that has been determined through a land use or management plan to best meet the plan's objectives for a site. A real, documented plant community that embodies the resource attributes needed for the present or potential use of an area, the desired plant community is consistent with the site's capability to produce the required resource attributes through natural succession, management intervention, or a combination of both.

DETRITAL COVER: Cover that consists of dead organic matter.

DETRITUS: Disintegrated matter, such as rock fragments or organic debris, accumulated in pond water, mud, or soil.

DIKE: An upright or steeply dipping sheet of igneous rock that has solidified in a crack or fissure in the earth's crust; a human-made structure used to control stream flow.

DIRECTIONAL DRILLING: The drilling of a borehole at an angle from the vertical to reach a subsurface area that is not directly beneath the point where the bit enters the earth.

DISCHARGE (WATER): The rate of flow or volume of water that passes a given point within a stream during given period of time. Also see INSTANTANEOUS DISCHARGE.

DISCLIMAX: An enduring climax community altered by human or livestock disturbance, such as a grassland that has replaced a deciduous forest. Also see CLIMAX.

DISPERSED RECREATION: Recreation activities that do not require developed sites or facilities.

DISTURBANCE REGIME: The regular pattern of occurrence or characteristic behavior of disturbance, which includes type, intensity, frequency, and spatial extent.

DIVISION FENCE: A fence that separates pastures or allotments.

DRAW: A natural drainage basin or gully.

EASEMENT: The right to use land in a certain way granted by a landowner to a second party. Also see CONSERVATION EASEMENT.

ECOLOGICAL CONDITION: See ECOLOGICAL SITE RATING.

ECOLOGICAL INTEGRITY: The quality of a natural unmanaged or managed ecosystem in which the natural ecological processes are sustained, with genetic, species, and ecosystem diversity assured for the future.

ECOLOGICAL NICHE: See NICHE.

ECOLOGICAL SITE (RANGE SITE): A distinctive kind of land that has specific physical characteristics and that differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation.

ECOLOGICAL SITE DESCRIPTIONS (RANGE SITE GUIDE): Descriptions of the following characteristics of an ecological site: soils, physical features, climatic features, associated hydrologic features, plant communities possible on the site, plant community dynamics, annual production estimates and distribution of production throughout the year, associated animal communities, associated and similar sites, and interpretations for management.

ECOLOGICAL SITE INVENTORY: The basic inventory of present and potential vegetation on BLM rangeland.

ECOLOGICAL SITE RATING (ECOLOGICAL CONDITION, ECOLOGICAL STATUS): The present state of vegetation of an ecological site in relation to the potential natural community for the site. Independent of the site's use, the ecological site rating is an expression of the relative degree to which the kinds, proportions, and amounts of plants in a community resemble those of the potential natural community. The four ecological status classes correspond to 0-25%, 25-50%, 51-75%, or 76-100% similarity to the potential natural community and are called early-seral, mid-seral, late-seral, and potential natural community, respectively.

ECOSYSTEM: Organisms, together with their abiotic environment, forming an interacting system and inhabiting an identifiable space.

ECOTOURISM: Tourism that essentially focuses on natural rather than developed attractions with the goal of enhancing the visitor's understanding and appreciation of nature and natural features. Such tourism often attempts to be environmentally sound and to contribute economically to the local community.

ELECTROFISHING (ELECTROSHOCKING):
A fish collection method employed by professional fishery biologists using a pulse of electricity to stun fish.

ELIGIBLE RIVER SEGMENT: Qualification of a river for inclusion into the National Wild and Scenic Rivers System by determining that it is free flowing and, with its adjacent land area, has at least one river-related value considered to be outstandingly remarkable.

EMERGENT VEGETATION: Aquatic plant species that are rooted in wetlands but extend above the water's surface. Also see SUBMERGENT VEGETATION.

ENDANGERED SPECIES: Any animal or plant species in danger of extinction throughout all or a significant portion of its range as designated by the U.S. Fish and Wildlife Service under the Endangered Species Act. Also see THREATENED SPECIES.

ENERGY FLOW: The intake, conversion, and passage of energy through organisms or through an ecosystem.

ENTRENCHMENT: The process by which a stream erodes downward (incision) creating vertical, often eroding, banks and abandoning its flood plain. Entrenched streams are often referred to as gullies.

ENVIRONMENTAL ASSESSMENT (EA): A concise public document for which a federal agency is responsible. An EA serves (1) to briefly provide enough evidence and analysis for determining whether to prepare an environmental impact statement (EIS) or a finding of no significant impact and to aid an agency's compliance with the National Environmental Policy Act when no EIS is needed; and (2) to facilitate preparing an EIS when one is needed. Also see ENVIRONMENTAL IMPACT STATEMENT.

ENVIRONMENTAL IMPACT STATEMENT (EIS): An analytical document that portrays potential impacts on the human environment of a particular course of action and its possible alternatives. Required by the National Environmental Policy Act (NEPA), an EIS is prepared for use by decision makers to weigh the environmental consequences of a potential decision. Also see ENVIRONMENTAL ASSESSMENT.

ENVIRONMENTAL JUSTICE (EJ): The fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income, in developing, implementing, and enforcing environmental laws, regulations, and policies.

EPHEMERAL STREAM: A stream or portion of a stream that (1) flows only in direct response to precipitation, (2) receives little or no water from springs or no long continued supply from snow or other sources, and (3) has a channel that is always above the water table.

ETHNOECOLOGY: The study of the relationship between a society and its natural environment, including the spatio-temporal organization of human activities and how nature and natural resources are used (hunting, fishing, collecting, farming, preparing food); the study of how people perceive and manipulate their environments.

EXCLOSURE: An area fenced to exclude animals.

EXOTIC: An organism or species that is not native to the region in which it's found.

EXTIRPATED SPECIES: A locally extinct species; a species that is no longer found in a locality but exists elsewhere.

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EXTIRPATION: See EXTIRPATED SPECIES.

FAULT BLOCK MOUNTAINS (BLOCK MOUNTAINS): Mountains formed by block faulting, which divides the earth's crust into fault blocks of different elevations and orientations.

FECAL COLIFORM BACTERIA: A group of organisms found in the intestinal tracts of people and animals. Their presence in water shows pollution and possible dangerous bacterial contamination.

FECAL STREPTOCOCCUS (STREP) BACTERIA: Bacteria of the intestinal tract with the ability to grow at relatively high pH and temperature and used as an indicator of recent fecal pollution by warm-blooded animals, including humans.

FEDERAL LAND POLICY AND MANAGEMENT ACT (FLPMA): The act that (1) set out for the Bureau of Land Management standards for managing the public lands, including land use planning, sales, withdrawals, acquisitions, and exchanges; (2) authorized the setting up of local advisory councils representing major citizens groups interested in land use planning and management, (3) established criteria for reviewing proposed wilderness areas, and (4) provides guidelines for other aspects of public land management such as grazing.

FEE SIMPLE TITLE: Unrestricted ownership of real property (land and whatever is erected or growing on it).

FINDING OF NO SIGNIFICANT IMPACT (FONSI): A document that is prepared by a federal agency and that briefly explains why an action not otherwise excluded from the requirement to prepare an environmental impact statement (EIS) would not significantly affect the human environment and not require an EIS.

FINE PARTICULATE MATTER ($PM^{2.5}$): Particulate matter that is less than 2.5 microns in diameter. Also see PARTICULATE MATTER and INHALABLE PARTICULATE MATTER.

FIRE INTENSITY: The rate of heat release for an entire fire at a specific time.

FIRE SUPPRESSION: All the work of extinguishing or confining a fire, beginning with its discovery.

FIXED STOCKING RATE: A stocking rate that is fixed and cannot vary from season to season or year to year. Also see STOCKING RATE and VARIABLE STOCKING RATE.

FLOODPLAIN: Nearly level land on either or both sides of a channel that is subject to overflow flooding. Also see HUNDRED-YEAR FLOOD and HUNDRED-YEAR FLOODPLAIN.

FORAGE: All browse and herbage that is available and acceptable to grazing animals or that may be harvested for feed.

FORB: A herbaceous plant that is not a grass, sedge, or rush.

FREE USE PERMIT: A permit that allows the removal of timber or other resources from the public lands free of charge.

FUEL LOAD (IN FIRE SUPPRESSION): The ovendry weight of fuel per unit area, usually expressed in tons/acre.

FUEL MOISTURE CONTENT (FUEL MOISTURE) (IN FIRE SUPPRESSION): The water content of a fuel expressed as a percentage of the fuel's ovendry weight. For dead fuels, which have no living tissue, moisture content is determined almost entirely by relative humidity, precipitation, dry-bulb temperature, and solar radiation. The moisture content of live fuels is physiologically controlled within the living plant.

FUNCTIONING WATERS (WILDLIFE): A well, catchment, spring, reservoir, or other feature (human made or natural) that provides a reliable source of potable water on a year-long basis. For such a source of water to be considered functional, the quality and quantity of water must be sufficient to sustain native wildlife populations in the local area. For example, a reservoir that fills up during monsoon rains but goes dry in a few weeks is not functional from a wildlife standpoint.

GALLERY (GALLERY FOREST): A forest growing along a water course in a region otherwise devoid of trees.

GENERALIST: An organism that can survive under a wide variety of conditions and does not specialize to live under any particular set of circumstances.

GLIDE: A slow-moving, relatively shallow area of flowing water that lacks surface agitation or waves and approximates uniform flow and in which the slope of the water surface is roughly parallel to the overall gradient of the stream reach.

GRASS BANK: An unallocated allotment used as a short-term reserve forage supply where livestock from another allotment can graze during drought or in place of another allotment that has undergone fire or vegetation treatment. Also see VEGETATION TREATMENTS.

GRAZING CAPACITY (CARRYING CAPACITY): The highest livestock stocking rate possible without damaging vegetation or related resources. Grazing capacity may vary from year to year or in the same area because of fluctuating forage production.

GRAZING CYCLE: The amount of time required for livestock to rotate completely through all the pastures in an allotment management plan.

GRAZING PERMIT/LICENSE/LEASE: Official written permission to graze a specific number, kind, and class of livestock for a specified period on a defined rangeland.

GRAZING PRIVILEGES: The use of public land for livestock grazing under permits or leases.

GRAZING REST: Any period during which no livestock grazing is allowed within an area.

GRAZING SEASON: An established period for which grazing permits are issued.

GRAZING SYSTEM: A systematic sequence of grazing use and nonuse of an allotment to meet multiple use goals by improving the quality and amount of vegetation.

GROUND COVER: See COVER.

GROUNDWATER: Subsurface water and underground streams that supply wells and springs. Use of groundwater in Arizona does not require a water right but must only be 'reasonable.' Groundwater is separated from surface water by the type of alluvium in which the water is found. Water in the younger, floodplain alluvium is considered surface water. Water in the older, basin-fill alluvium is considered groundwater.

GROUP: For a recreation site in the Empire-Cienega Planning Area, more than 29 people.

GULLY: A channel or miniature valley cut by concentrated runoff but through which water commonly flows only during and immediately after heavy rains or while snow is melting.

GULLY EROSION: The erosion process by which water flows through narrow channels and over short periods removes the soil from this narrow area to depths ranging from 1-2 feet to as much as 75-100 feet.

GULLY PLUG: (CHECK DAM): A low dam, built of a wide variety of material, including logs, treated lumber, stone, concrete, and synthetic materials, and used to flatten the slope of the gully, dissipate the energy of moving water, and control gully erosion.

HABITAT: An area that provides an animal or plant with adequate food, water, shelter, and living space.

HABITAT FRAGMENTATION: Process by which habitats are increasingly subdivided into smaller units, resulting in their increased insularity and losses of total habitat area.

HABITAT MANAGEMENT PLAN: A site-specific wildlife habitat plan.

HALF-SHRUB: A perennial plant with a woody base whose annually produced stems die each year.

HAZARDOUS MATERIALS (HAZMAT): An all-encompassing term that includes hazardous substances; hazardous waste; hazardous chemical substances; toxic substances; pollutants and contaminants; and imminently hazardous chemical substances and mixtures that can pose an unreasonable risk to human health, safety, and property.

HEADCUT: The abrupt change in elevation at the head of a gully.

HEADCUTTING: The erosional process by which a gully migrates up slope by water flowing in at its head. Headcutting is characterized by an increase in depth and width and a decrease in slope.

HEAP LEACHING: A low-cost technique for extracting metals from ore by percolating leaching solutions through heaps of ore placed on impervious pads. This method is generally used on low-grade ores.

HERBACEOUS: Of, relating to, or having the characteristics of a vascular plant that does not develop woody tissue.

HISTORIC STRUCTURE REPORT: The documentation of the physical condition of a historic structure and measures needed to preserve it.

HOHOKAM: A group of North American Indians who lived between perhaps 300 BC and AD 1400 in central and southern Arizona, largely along the Gila and Salt rivers.

HOLDING AREA (HOLDING GROUND): An area where livestock are often held during roundups.

HUNDRED-YEAR FLOOD: A flood that has a 1 in 100 chance of occurring in any given year.

HUNDRED-YEAR FLOODPLAIN: The area flooded by a 100-year flood.

HYDRIC: Characterized by, relating to, or requiring an abundance of moisture.

HYDROLOGIC CYCLE: The circuit of water movement from the atmosphere to the earth and its return to the atmosphere through various stages or processes, such as precipitation, interception, runoff, infiltration, percolation, storage, evaporation, and transpiration.

IGNEOUS ROCK: Rock, such as granite and basalt, that has solidified from a molten or partially molten state.

INCIDENT COMMANDER: The person responsible for managing all operations in response to incidents (wildfires and other events requiring emergency action).

INDIVIDUAL GRAZING ALLOTMENT: A grazing allotment on which a single permittee grazes livestock.

INFILTRATION: The downward entry of water into the soil or other material.

INFRASTRUCTURE: The set of systems and facilities that support a region or community's social and economic structures. Examples of such systems include energy, transportation, communication, education, medical service, and fire and police protection.

INHALABLE PARTICULATE MATTER (PM^{10}): Particulate matter in ambient air exceeding 10 microns in diameter. Also see PARTICULATE MATTER and FINE PARTICULATE MATTER.

INSTANTANEOUS DISCHARGE: The volume of water that passes a given point at a particular instant of time. Also see DISCHARGE.

INSTREAM WATER USE: Water use within a stream channel for such purposes as navigation, recreation, fish and wildlife preservation, water quality improvement, and hydroelectric power generation.

INSTREAM WATER RIGHT (or INSTREAM FLOW WATER RIGHT): A water right that reserves water for and protects such specific instream water uses as fish spawning and recreation. (Also see INSTREAM WATER USE.) The instream water right allows water needed for these activities to be set aside and keeps later water users from appropriating water that may affect the instream activity.

INTEGRATED VEGETATION MANAGEMENT: A vegetation management approach that consists of selecting and integrating treatment methods for predicted ecological, sociological, and economic effects. Where proposed for the Empire-Cienega Planning Area, this approach would allow the use of prescribed burning and chemical (mainly herbicide) applications as well as manual, mechanical, and biological treatments. Under this approach BLM will select vegetation treatments for a particular project in response to site-specific analyses.

INTERMITTENT STREAM: A stream that generally flows during wet seasons but is dry during dry seasons.

INVASIVE SPECIES (INVADERS): Plant species that were either absent or present only in small amounts in undisturbed portions of a specific range site's original vegetation and invade following disturbance or continued overuse.

KEY FORAGE SPECIES: Forage species whose use serves as an indicator of the degree of use of associated species.

KEYSTONE SPECIES: Species that create a special habitat on which other species depend and without which some wildlife would become severely depleted. Two example of key stone species are beavers, which create ponds, and prairie dogs, which create burrows.

LAND AND WATER CONSERVATION FUND: Established by the Land and Water Conservation Fund Act, a fund that the Federal Government can use to acquire and develop land and water for conservation and outdoor recreation and to help states in planning for, acquiring, and developing land and water areas and facilities.

LAND USE AUTHORIZATION: BLM's authorizing through leases, permits, and easements of uses of the public land. Land use authorizations may allow occupancy, recreational residences and cabin sites, farming, manufacturing, outdoor recreation concessions, National Guard maneuvers, and many other uses.

LARAMIDE OROGENY: A series of mountain building events that affected much of western North America in Late Cretaceous and Early Tertiary periods. (The Cretaceous period ended 65 million years ago and was followed by the Tertiary period.)

LEASABLE MINERALS: Minerals whose extraction from federally managed land requires a lease and the payment of royalties. Leasable minerals include coal, oil and gas, oil shale and tar sands, potash, phosphate, sodium, and geothermal steam.

LEAVE NO TRACE: A nationwide (and international) program to help visitors with their decisions when they travel and camp on America's public lands. The program strives to educate visitors about the nature of their recreational impacts as well as techniques to prevent and minimize such impacts.

LITTER: The uppermost layer of organic debris on the soil surface, essentially freshly fallen or slightly decomposed vegetal material.

LIVE FUEL MOISTURE: See FUEL MOISTURE.

LIVESTOCK PERFORMANCE: The efficiency of livestock within an operation as measured by such indicators as percent calf crop, weaned calf weights, animal death rates, and cull cow weights.

LIVESTOCK TRESPASS: The unauthorized grazing of livestock.

LOAM: A soil texture class for soil material that contains 7 to 27% clay, 28 to 50% silt, and less than 52% sand.

LOCATABLE MINERALS: Minerals that may be acquired under the Mining Law of 1872, as amended.

LOCATION: The act of taking or appropriating a parcel of mineral land, including the posting of notices, the recording thereof when required, and marking the boundaries so they can be readily traced.

LONG TERM MANAGEMENT AREAS (LTMAs): Twenty-four areas established by the Land Tenure Amendment to BLM Safford District's Resource Management Plan in 1994 to be intensively managed for their multiple resource values as defined in the Federal Land Policy and Management Act of 1976. In these LTMAs BLM will retain all public land (surface and subsurface) and may seek to acquire state and private lands. Also see RESOURCE CONSERVATION AREA.

MACROPHYTE: Any plant that can be seen with the unaided eye, such as aquatic mosses, ferns, liverworts, and rooted plants.

MADREAN: Characteristic of or relating to the Sierra Madre of Mexico.

MAJOR LAND RESOURCE AREAS (MLRAs): Broad geographic areas that have a particular pattern of soils, climate, water resources, vegetation, and land use. Each MLRA in which range and forest land occur is further broken into range sites.

MAJOR RIGHTS-OF-WAY: Rights-of-way along which pass transmission lines (consisting of 115kV or higher) used to transmit large blocks of energy to load centers for distribution.

MANAGEMENT SITUATION ANALYSIS (MSA): Step 4 in BLM's resource management planning process. An MSA describes a planning area's current public land management and suggests opportunities to better manage this land.

MERISTEM: The tissue or zone in a plant from which new cells are produced by cell division.

MESOZOIC ERA: One of the great eras of geologic time (248 million to 65 million years ago), following the Paleozoic era, preceding the Cenozoic era, and including the Triassic, Jurassic, and Cretaceous periods.

MICROHABITAT: The smallest unit of a habitat, like a clump of grass or a space between rocks.

MINERAL ENTRY: The filing of a claim on public land to obtain the right to any minerals it may contain.

MINERALIZATION: The processes taking place in the earth's crust resulting in the forming of valuable minerals or ore bodies.

MINERAL MATERIALS: Materials such as common varieties of sand, stone, gravel, pumice, pumicite, and clay, that are not obtainable under the mining or leasing laws but that can be acquired under the Mineral Materials Act of 1947, as amended.

MINERAL WITHDRAWAL: A formal order that withholds federal lands and minerals from entry under the Mining Law of 1872 and closes the area to mineral location (staking mining claims), development, and leasing.

MINING DISTRICT: An area, usually designated by name, with described or understood boundaries, where minerals are found and mined under rules prescribed by the miners, consistent with the Mining Law of 1872.

MINING PLAN OF OPERATIONS: A plan for mineral exploration and development that a mining operator must submit to BLM for approval for all mining, milling, and bulk sampling of more than 1,000 tons and for exploration disturbing more than 5 acres or on special status lands, including wilderness, areas of critical environmental concern, national monuments, national conservation areas, and lands containing proposed or listed threatened or endangered species or their critical habitat. A plan of operations must document in detail all actions that the operator plans to take from exploration through reclamation.

MONITORING: The collection of information to determine the effects of resource management and detect changing resource trends, needs, and conditions.

MOSAIC: A pattern of vegetation in which two or more kinds of communities are interspersed in patches.

MOTORIZED TRAIL: A designated route that allows for the use of small-wheel-based motorized vehicles such as all-terrain vehicles and motorcycles.

MULTIPLE USE: A combination of balanced and diverse resource uses that considers long-term needs for renewable and nonrenewable resources, including recreation, wildlife, rangeland, timber, minerals, and watershed protection, along with scenic, scientific, and cultural values.

NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS): The allowable concentrations of air pollutants in the ambient (public outdoor) air specified in 40 CFR 50. National ambient air quality standards are based on the air quality criteria and divided into primary

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standards (allowing an adequate margin of safety to protect the public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly) and secondary standards (allowing an adequate margin of safety to protect the public welfare). Welfare is defined as including effects on soils, water, crops, vegetation, human-made materials, animals, wildlife, weather, visibility, climate, and hazards to transportation, as well as effects on economic values and on personal comfort and well-being.

NATIONAL CONSERVATION AREA (NCA): A congressionally designated public land area that contains important resources and whose management objectives are (1) to conserve and protect these resources, (2) to maintain environmental quality, and (3) to provide for present and future users within a framework of multiple use and sustained yield.

NATIONAL ENVIRONMENTAL POLICY ACT (NEPA): The federal law, going into effect on January 1, 1970, that established a national policy for the environment and requires federal agencies (1) to become aware of the environmental ramifications of their proposed actions, (2) to fully disclose to the public proposed federal actions and provide a mechanism for public input to federal decision making, and (3) to prepare environmental impact statements for every major action that would significantly affect the quality of the human environment.

NATIONAL HISTORIC PRESERVATION ACT OF 1966, AS AMENDED (NHPA): A federal statute that established a federal program to further the efforts of private agencies and individuals in preserving the Nation's historic and cultural foundations. NHPA (1) authorized the National Register of Historic Places, (2) established the Advisory Council on Historic Preservation and a National Trust Fund to administer grants for historic preservation, and (3) authorized the development of regulations to require federal agencies to consider the effects of federally assisted activities on properties included on or eligible for the National Register of Historic Places. Also see NATIONAL REGISTER OF HISTORIC PLACES.

NATIONAL REGISTER OF HISTORIC PLACES: The official list, established by the National Historic Preservation Act, of the Nation's cultural resources worthy of preservation. The National Register lists archeological, historic, and architectural properties (districts, sites, buildings, structures, and objects) nominated for their local, state, or national significance by state and federal agencies and approved by the National Register Staff. The National Park Service maintains the National Register. Also see NATIONAL HISTORIC PRESERVATION ACT.

NATIONAL REGISTER QUALITY (CULTURAL RESOURCES): Cultural resource properties that meet the National Register criteria and have been determined eligible for nomination to the National Register of Historic Places because of their local, state, or national significance.

NATIONAL WILD AND SCENIC RIVERS SYSTEM: A system of nationally designated rivers and their immediate environments that have outstanding scenic, recreational, geologic, fish and wildlife, historical, cultural, and other similar values and are preserved in a free-flowing condition. The system consists of three types of streams: (1) recreation—rivers or sections of rivers that are readily accessible by road or railroad and that may have some development along their shorelines and may have undergone some impoundments or diversion in the past, (2) scenic—rivers or sections of rivers free of impoundments with shorelines or watersheds still largely undeveloped but accessible in places by roads, and (3) wild—rivers or sections of rivers free of impoundments and generally inaccessible except by trails with watersheds or shorelines essentially primitive and waters unpolluted.

NATIVE DIVERSITY: The diversity of species that have evolved in a given place without human influence.

NATIVE SPECIES: A species that is part of an area's original flora and fauna.

NEOTROPICAL MIGRATORY BIRDS: Birds that travel to Central America, South America, the Caribbean, and Mexico during the fall to spend the winter and then return to the United States and Canada during the spring to breed. These birds include almost half of the bird species that breed in the United States and Canada.

NEST PARASITISM (BROOD PARASITISM): The exploitation by one bird species of the parental behavior of another species. A nest parasite lays eggs in the nest of another bird species to be cared for by a host. The parasite benefits from saving time, energy, and survival prospects, whereas the host may suffer partial or complete loss of its own current reproduction.

NEXT BEST PASTURE GRAZING SYSTEM: A livestock grazing strategy under which, when the desired level of use is made in a pasture, all rested (unused) pastures are evaluated, and the pasture that looks best from a grazing standpoint is used next. After the desired level of use is made of that pasture, all rested pastures are examined again, and the pasture in best shape is grazed. This is a good system where rainfall patterns are spotty (the entire allotment hasn't received an equal amount of precipitation). Extremely sensitive to environmental variables, this system gives the operator the most flexibility and provides needed rest for vegetation.

NICHE: The role of an organism in the environment, its activities and relationships to the biotic and abiotic environment.

NICK POINT: A place of abrupt change in a stream gradient.

NODE: A point on a plant's stem from which a leaf or leaves grow.

NONPOINT SOURCE POLLUTION (WATER): Pollution sources that are diffuse and do not have a single point of origin or are not introduced into a receiving water body from a specific outlet. These pollutants are generally carried off the land by storm water runoff from such sources as farming, forestry, mining, urban land uses, construction, and land disposal.

NONUSE: An authorization that BLM issues to applicants for nonuse of grazing privileges in whole or part, usually for one grazing season.

NO SURFACE OCCUPANCY: A fluid mineral leasing stipulation that prohibits occupancy or disturbance on all or part of the lease surface to protect special values or uses. Lessees may explore for or exploit the fluid minerals under leases restricted by this stipulation by using directional drilling from sites outside the no surface occupancy area. Also see DIRECTIONAL DRILLING.

NOXIOUS PLANT: An unwanted plant specified by federal or state laws as being undesirable, and requiring control. Noxious weeds are usually non-natives and highly invasive.

NUTRIENT CYCLE: A general term for the movement of any particular life-essential substance through the physical and biological environment. Essential nutrient cycles include those of carbon, nitrogen, oxygen, and water.

OBLIGATE: Essential, necessary, unable to exist in any other state, mode, or relationship.

OFF-HIGHWAY VEHICLE (OHV): Any vehicle capable of or designed for travel on or immediately over land, water, or other natural terrain, deriving motive power from any source other than muscle. OHVs exclude (1) any nonamphibious registered motorboat; (2) any fire, emergency, or law enforcement vehicle while being used for official or emergency purposes; and (3) any vehicle whose use is expressly authorized by a permit, lease, license, agreement, or contract issued by an authorized officer or otherwise approved.

OIL AND GAS SHOW: The detectable presence of oil or gas in a borehole, as determined by examining the core or cuttings.

OIL SEEP: A surface location where oil, having permeated its subsurface boundaries, has accumulated in small pools.

OVERBURDEN: All the earth and other materials that overlie a natural mineral deposit.

OVERSTORY: The portion of the trees in a forest stand forming the upper crown cover. Also see UNDERSTORY.

PALEONTOLOGICAL RESOURCES: The remains of plants and animals preserved in soils and sedimentary rock. Paleontological resources are important for understanding past environments, environmental change, and the evolution of life.

PALEOZOIC ERA: An era of geologic time (600 million to 280 million years ago) between the Late Precambrian and the Mesozoic eras and comprising the Cambrian, Ordovician, Silurian, Devonian, Missippian, Pennsylvanian, and Permian periods.

PANICULATE AGAVE: A reference to the growth form of certain agave species, such as Palmer's agave (*Agave palmeri*) and Parry's agave *(Agave parryi)* whose flowers are arranged on the stalk in a pyramidal, loosely branched cluster (panicle). The nectar and pollen of paniculate agaves are consumed by the lesser long-nosed bat, a federally listed endangered species.

PARTICULATE MATTER: Fine liquid or solid particles suspended in the air and consisting of dust, smoke, mist, fumes, and compounds containing sulfur, nitrogen, and metals. Also see FINE PARTICULATE MATTER and INHALABLE PARTICULATE MATTER.

PASTURE: A grazing area that is separated from other areas by fencing or natural barriers.

PERFORMANCE: See LIVESTOCK PERFORMANCE.

PERENNIAL PLANT: A plant that has a life cycle of 3 or more years. Also see ANNUAL PLANT.

PERENNIAL STREAM: A stream that flows continuously during all seasons of the year.

PERSONAL INCOME: The sum of wage and salary payments, other labor income, proprietors' income, rental income of persons, personal dividend and interest income, and transfer payments to persons, less personal contributions for social insurance.

PHENOLOGY (PHENOLOGIES): The study of periodic biological phenomena, such as flowering or seeding, especially as related to climate.

PIPING: See SOIL PIPING.

PITHOUSE: A wood and earthen structure inhabited by prehistoric American cultures.

PLACER CLAIM: A mining claim located on surficial or bedded deposits, particularly for gold located in stream gravels.

PLAN OF OPERATIONS: See MINING PLAN OF OPERATIONS.

PLANT VIGOR: The relative well being and health of a plant as reflected by its ability to manufacture enough food for growth and maintenance.

PLANT SUCCESSION: The process of vegetational development by which an area becomes successively occupied by different plant communities of higher ecological order.

PLEISTOCENE (ICE AGE): An epoch in the Quarternary period of geologic history lasting from 1.8 million to 10,000 years ago. The Pleistocene was an epoch of multiple glaciation, during which continental glaciers covered nearly one fifth of the earth's land.

PLUTON: A typically large body of igneous rock that has formed beneath the earth's surface.

PONDING: The formation of ponds by standing water in closed depressions. The water is removed only by deep percolation, transpiration, evaporation, or a combination of these processes.

POOL: A portion of a stream that has reduced current velocity and often water deeper than surrounding areas and that is frequently usable by fish for resting and cover.

POPULATION: A group of interbreeding organisms of the same kind occupying a particular space. A group of individuals of a species living in a certain area.

POPULATION CRASH: A period of heavy death and sharp decline in numbers of an animal species with strongly developed population cycles; the population decline during such a period.

PORPHYRY COPPER: A disseminated replacement deposit in which copper minerals occur as discrete grains and veinlets throughout a large volume of rock; a large-tonnage, low-grade copper deposit.

POTENTIAL NATURAL COMMUNITY (PNC): The stable biotic community that would become established on an ecological site if all successional stages were completed without human interference under present environmental conditions. The PNC is the vegetation community best adapted to fully use the resources of an ecological site.

PRESCRIBED FIRE (BURNING): The planned applying of fire to rangeland vegetation and fuels under specified conditions of fuels, weather, and other variables to allow the fire to remain in a predetermined area to achieve such site-specific objectives as controlling certain plant species; enhancing growth, reproduction, or vigor of plant species; managing fuel loads; and managing vegetation community types.

PRIME FARMLAND: As defined by the Farmland Protection Policy Act of 1981, land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor, and without intolerable soil erosion, as determined by the Secretary of Agriculture. Prime farmland includes land with the above characteristics but is being used to produce livestock and timber. It does not include land already in or committed to urban development or water storage. Also see UNIQUE FARMLAND.

PRIMITIVE RECREATION: Recreation that provides opportunities for isolation from the evidence of humans, a vastness of scale, feeling a part of the natural environment, having a high degree of challenge and risk, and using outdoor skills. Primitive recreation is characterized by meeting nature on its own terms, without comfort or convenience of facilities.

PROPER FUNCTIONING CONDITION (RIPARIAN-WETLAND AREAS): The condition where (1) enough vegetation, landform, or large woody debris is present to dissipate the stream energy of high water flows, thereby reducing erosion and improving water quality; (2) sediments are filtered, bedload is captured, and floodplains develop; (3) flood water retention and ground water recharge are improved, root masses that stabilize streambanks against cutting action develop, and diverse ponding and channel characteristics are created to provide the habitat and the water depth, duration, and temperature needed for fish production, waterfowl breeding, and other uses; and (4) greater biodiversity is supported.

PROSPECTIVELY VALUABLE FOR OIL AND GAS: Known or believed to contain oil and gas deposits that have or at some time in the future may prove to have economic value.

PROTOHISTORY: The period of time immediately before recorded history.

PUBLIC DOMAIN LANDS: Lands that are part of the original public domain and have never left federal ownership and lands in federal ownership that were acquired in exchange for public domain lands or for timber on public domain lands.

PUBLIC LANDS: As defined by Public Law 94-579 (Federal Land Policy and Management Act of 1976), lands and interest in land owned by the United States and administered by the Secretary of the Interior through BLM, regardless of how the United States acquired possession. In common usage, public lands may refer to all federal land, no matter what agency manages it. Also see ACQUIRED PUBLIC LANDS.

QUARTERNARY PERIOD: The current period of geologic history and second period of the Cenozoic era, which is believed to have covered the last 2 million to 3 million years.

RANGE IMPROVEMENT: Any activity or program on or relating to the public lands designed to improve forage production, change vegetation composition, control use patterns, provide water, stabilize soil and water conditions, or provide habitat for livestock and wildlife. Range improvements may be structural or nonstructural. A structural improvement requires placement or construction to facilitate the management or control the distribution and movement of animals. Such improvements may include fences, wells, troughs, reservoirs, pipelines, and cattleguards. Nonstructural improvements consist of practices or treatments that improve resource conditions. Such improvements include seedings; chemical, mechanical, and biological plant control; prescribed burning; water spreaders; pitting; chiseling; and contour furrowing.

RANGELAND: A kind of land on which the native vegetation, climax, or natural potential consists predominately of grasses, grasslike plants, forbs, or shrubs. Rangeland includes lands revegetated naturally or artificially to provide a plant cover that is managed like native vegetation. Rangelands may consist of natural grasslands, savannas, shrublands, moist deserts, tundra, alpine communities, coastal marshes, and wet meadows.

RANGELAND ECOLOGICAL SITE: A distinctive kind of land that has specific physical characteristics and that differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation.

RANGE SITE: See ECOLOGICAL SITE.

RANGE SITE GUIDE: See ECOLOGICAL SITE DESCRIPTIONS.

RAPTORS: Birds of prey.

REACH: A relatively homogeneous section of a stream having a repetitious sequence of physical characteristics and habitat types.

RECHARGE: See AQUIFER RECHARGE.

RECOGNIZED ENVIRONMENTAL CONDITION: The presence or likely presence of any hazardous substance or petroleum product on a property under conditions that indicate an existing or past release, or a material threat of a release into the ground, groundwater, or surface water.

RECORD OF DECISION: A document signed by a responsible official recording a decision that was preceded by the preparing of an environmental impact statement. Also see DECISION RECORD.

RECREATION OPPORTUNITY SPECTRUM (ROS): A planning process that provides a framework for defining classes of outdoor recreation environments, activities, and experience opportunities. In ROS the setting, activities, and opportunities for experiences are arranged along a spectrum of six classes: primitive, semiprimitive nonmotorized, semiprimitive motorized, roaded natural, rural, and urban. The resulting ROS analysis defines specific geographic areas on the ground, each of which encompasses one of the six classes.

RECREATION ZONE: A planned and delineated area with designated recreation opportunities, settings, and activities.

RECRUITMENT: The increase in population caused by natural reproduction or immigration.

REFUGIUM: An area that has remained unaffected by adverse environmental changes to the surrounding area, allowing a population to survive where others have perished.

REPLACEMENT DEPOSIT: A mineral deposit formed by a new mineral of partly or wholly differing chemical composition growing in the body of an old mineral or aggregate.

RESEARCH NATURAL AREA (RNA): A physical or biological unit in which current natural conditions are maintained insofar as possible. In RNAs activities such as grazing and vegetation are prohibited unless they replace natural processes and contribute to protecting and preserving an area. Moreover, such recreation as camping and gathering plants is discouraged.

RESISTANCE TO CONTROL (WILDFIRE): The relative difficulty of building and holding a fire control line as affected by fire behavior, fuel, topography, and soil.

RESOURCE ADVISORY COUNCILS (RACs): Advisory councils appointed by the Secretary of the Interior and consisting of representatives of major public land interest groups (commodity industries, recreation, environmental, and local area interests) in a state or smaller area. RACs advise the Bureau of Land Management, focusing on a full array of multiple use public land issues. RACs also help develop fundamentals for rangeland health and guidelines for livestock grazing.

RESOURCE CONSERVATION AREA (RCA): A land management designation that provides management consideration to areas that have special resources but don't need the protection conferred by an area of critical environmental concern. Also see LONG TERM MANAGEMENT AREAS.

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RESOURCE MANAGEMENT PLAN (RMP): A BLM planning document that is prepared in accord with Section 202 of the Federal Land Policy and Management Act and that presents systematic guidelines for making resource management decisions for a resource area. An RMP is based on an analysis of an areas's resources, their existing management, and their capability for alternative uses. RMPs are issue oriented and developed by an interdisciplinary team with public participation.

REST: See GRAZING REST.

RESTORATION (CULTURAL RESOURCE): The process of accurately reestablishing the form and details of a property or portion of a property, together with its setting, as it appeared in a particular period of time. Restoration may involve removing later work that is not in itself significant and replacing missing original work. Also see STABILIZATION (CULTURAL RESOURCE).

REST-ROTATION GRAZING: A grazing system in which one part of the range is ungrazed for an entire grazing year or longer while other parts are grazed for a portion or all of a growing season.

RHIZOME: A horizontal underground plant stem that is often thickened by deposits of reserve food material, produces shoots above and roots below, and is distinguished from a true root in having buds, nodes, and usually scalelike leaves.

RIFFLE: Shallow rapids where water flows swiftly over completely or partially submerged obstructions to produce surface agitation but not standing waves.

RIGHT-OF-WAY: A permit or easement that authorizes the use of lands for certain specified purposes, commonly for pipelines, roads, telephone lines, or powerlines.

RIPARIAN: Pertaining to or situated on or along the bank of streams, lakes, and reservoirs.

RIPARIAN AREA: A form of wetland transition between permanently saturated wetlands and upland areas. Riparian areas exhibit vegetation or physical characteristics that reflect the influence of permanent surface or subsurface water. Typical riparian areas include lands along, adjacent to, or contiguous with perennially and intermittently flowing rivers and streams, glacial potholes, and the shores of lakes and reservoirs with stable water levels. Excluded are ephemeral streams or washes that lack vegetation and depend on free water in the soil.

ROAD PRISM: The area of ground containing a road surface and the cut and fill slopes for the road.

ROOT ZONE: The part of the soil that is or can be penetrated by plant roots.

RUN: An area of swiftly flowing water that lacks surface agitation or waves and approximates uniform flow, and whose water surface is roughly parallel to the overall gradient of the stream reach.

RUNOFF: The portion of a drainage area's precipitation that flows from the area.

SAFE YIELD: The rate at which water can be withdrawn from a groundwater basin (aquifer) without depleting the supply so as to cause undesirable effects.

SALEABLE MINERALS: Common variety minerals on the public lands, such as sand and gravel, which are used mainly for construction and are disposed of by sales or special permits to local governments.

SAVANNAH: A tropical or subtropical grassland containing scattered trees and drought-resistant undergrowth.

SCOPING: An early and open process for determining the scope of issues to be addressed in an environmental impact statement and the significant issues related to a proposed action.

SEASONAL GRAZING: Grazing restricted to a specific season.

SECTION: 640 acres, 1 mile square.

SECTION 404 PERMIT: A permit required by the Clean Water Act under specified circumstances when dredge or fill material is placed in the waters of the United States, including wetlands.

SECTION 7 CONSULTATION: The requirement of Section 7 of the Endangered Species Act that all federal agencies consult with the U.S. Fish and Wildlife Service or the National Marine Fisheries Service if a proposed action might affect a federally listed species or its critical habitat.

SEDIMENT: Solid material that originates mostly from disintegrated rocks and is transported by, suspended in, or deposited from water. Sediment includes chemical and biochemical precipitates and decomposed organic material, such as humus.

SEDIMENTARY ROCKS: Rocks, such as sandstone, limestone, and shale, that are formed from sediments or transported fragments deposited in water.

SEDIMENTATION: The process or action of depositing sediment.

SEDIMENT LOAD (SEDIMENT DISCHARGE): The amount of sediment, measured in dry weight or by volume, that is transported through a stream cross-section in a given time. Sediment load consists of sediment suspended in water and sediment that moves by sliding, rolling, or bounding on or near the streambed.

SEDIMENT TRANSPORT: The movement of mineral and organic solid materials in a stream.

SEDIMENT YIELD: The amount of sediment removed from a watershed over a specified period, usually expressed as tons, acre-feet, or cubic yards of sediment per unit of drainage area per year.

SEINING: Moving a seine (vertically hanging net) through water and bringing the two ends together to catch fish.

SENSITIVE SPECIES: All species that are under status review, have small or declining populations, live in unique habitats, or need special management. Sensitive species include threatened, endangered, and proposed species as classified by the U.S. Fish and Wildlife Service.

SHARED USE TRAIL: A trail shared by a variety of uses such as motorized and nonmotorized uses; a combination of nonmotorized uses such as hiking, horseback riding, and bicycling; or a combination of motorized uses such as dirt bikes and small and large four-wheel vehicles.

SHIPPING PASTURE: A small pasture in which livestock are kept for up to a week before being shipped out. Shipping pastures are preferred to corrals because of the large amount of dust that concentrated livestock can stir up in a corral.

SHOW: See OIL AND GAS SHOW.

SHRINK-SWELL POTENTIAL: The susceptibility of soil to volume change due to loss or gain in moisture content.

SIKES ACT OF 1974: A federal law that promoted federal-state cooperation in managing wildlife habitats on both BLM and Forest Service lands. The act required BLM to work with state wildlife agencies to plan the development and maintenance of wildlife habitats and had as its main tool the habitat management plan.

SMOKE PERMIT: In Arizona, a permit that an agency must obtain from the Arizona Department of Environmental Quality in order to conduct a prescribed burn. Also see PRESCRIBED FIRE.

SOCIAL TRAIL: An unplanned random trail made by first visitors and then followed by others.

SOIL MOISTURE: The water content stored in a soil.

SOIL PIPING: The removal of soil material through subsurface flow channels or "pipes" formed by seepage water.

SOIL PRODUCTIVITY: The capacity of a soil in its normal environment to produce a specified plant or sequence of plants under a specified system of management.

SOIL STABILITY: A qualitative term used to describe a soil's resistance to change. Soil stability is determined by intrinsic properties such as aspect, depth, elevation, organic matter content, parent material, slope, structure, texture, and vegetation.

SOIL STRUCTURE: The physical constitution of soil material as expressed by size, shape, and the degree of development of primary soil particles and voids into naturally or artificially formed structural units.

SONOITA VALLEY PLANNING PARTNERSHIP (SVPP): A partnership of people from federal, state, and local agencies and other interests that was formed in 1995 to work with the community on public land issues in an area of southeast Arizona defined roughly as the Cienega Creek watershed south of Interstate 10 and small portions of the upper watersheds of Sonoita Creek and the Babocomari River. The partnership, open to anyone wishing to participate, is an outgrowth of BLM attempts to involve more public participation in planning for the area and to improve communication and coordination with surrounding public and private landowners.

SPECIAL LAND USE PERMIT (SLUP): A permit granted for purposes neither authorized nor forbidden by law.

SPECIAL RECREATION PERMIT (SRP): An authorization that allows for specific nonexclusive permitted recreational uses of the public lands and related waters. SRPs are issued to control visitor use, protect recreational and natural resources, provide for the health and safety of visitors, and accommodate commercial recreational uses.

SPECIAL STATUS SPECIES: Plant or animal species listed as threatened, endangered, candidate, or sensitive by the Federal Government or state governments.

SPLIT-ESTATE: Land whose surface rights and mineral rights are owned by different entities. Such a condition commonly occurs when surface rights are owned by the Federal Government and the mineral rights are privately or state owned.

STABILIZATION (CULTURAL RESOURCE): Protective techniques usually applied to structures and ruins to keep them in their existing condition, prevent further deterioration, and provide structural safety without significant rebuilding. Capping mud-mortared masonry walls with concrete mortar is an example of a stabilization technique. Also see RESTORATION (CULTURAL RESOURCE).

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STABILIZATION (SOIL): Chemical or mechanical treatment to increase or maintain the stability of a mass of soil or otherwise improve its engineering properties.

STANDARDS AND GUIDELINES FOR RANGELAND HEALTH: See ARIZONA STANDARDS FOR RANGELAND HEALTH AND GUIDELINES FOR GRAZING ADMINISTRATION.

STAGING AREA: An area where participants in an activity gather and make final preparations for the activity.

STAMP: A machine for crushing ore, used particularly in gold milling.

STATE HISTORIC PRESERVATION OFFICER (SHPO): The official within and authorized by each state at the request of the Secretary of the Interior to act as liaison for the National Historic Preservation Act. Also see NATIONAL HISTORIC PRESERVATION ACT.

STATE LANDS: See STATE TRUST LANDS.

STATE TRUST LANDS: Lands granted to Arizona by the Federal Government at territorial establishment and at statehood. Totaling 9.4 million acres, these lands are managed by the Arizona State Land Department to yield revenue over the long term for the 14 trust beneficiaries. The chief beneficiary consists of the public schools. Whenever Arizona sells or leases these lands and their natural resources, it must pay the beneficiaries. Revenues from land sales are maintained in a permanent fund managed by the State Treasurer, and interest from this fund is paid to the beneficiaries.

STOCKING RATE: The number of specific kinds and classes of animals grazing or using a unit of land for a specific time period. Stocking rates may be expressed as a ratio, such as of animal units/section, acres/animal unit, or acres/animal unit month. Also see CONSERVATIVE STOCKING RATE.

STOCK TANK (POND): A water impoundment created by building a dam, digging a depression, or both to provide water for livestock or wildlife.

STREAMBANK: The portion of a stream channel that restricts the sideward movement of water at normal water levels. The streambank's gradient often exceeds 45°and exhibits a distinct break in slope from the stream bottom.

STREAMBANK STABILITY: A streambank's relative resistance to erosion, which is measured as a percentage of alteration to streambanks.

SUBECONOMIC: Lacking economic importance; not justifiable solely on economic grounds.

SUBIRRIGATED SOILS: Streamside soils into whose root zone the water table rises.

SUBMERGENT VEGETATION: Aquatic plants that grow only within water and do not break the water's surface. Also see EMERGENT VEGETATION.

SUBSTRATE: (1) Mineral and organic material forming the bottom of a waterway or water body. (2) The base or substance upon which an organism is growing.

SUBWATERSHED: A watershed subdivision of unspecified size that forms a convenient natural unit.

SUCCESSION: See PLANT SUCCESSION.

SUCCULENTS: Plants such as cacti that have fleshy tissues designed to conserve moisture.

SUPPLEMENTAL FEED: Concentrates or harvested feed that is fed to livestock to correct the deficiencies of a range diet.

SURFACE OCCUPANCY: See NO SURFACE OCCUPANCY.

SUSTAINED YIELD: Achieving and maintaining a permanently high level, annual or regular period production of renewable land resources without impairing the productivity of the land and its environmental values.

SWALE: A commonly wet or moist low-lying or depressed land area.

TAILINGS: The waste matter from ore after the extraction of economically recoverable metals and minerals.

TAKE: As defined by the Endangered Species Act, "to harass, harm, pursue, hunt, shoot, wound, kill, capture, or collect, or attempt to engage in any such conduct."

TARGET SPECIES: Plant species to be reduced or eliminated by a vegetation treatment. Also see VEGETATION TREATMENTS.

TERRESTRIAL SPECIES: Ground-dwelling plants and animals.

TERTIARY PERIOD: The earlier (65 million to 1.8 million years ago) of the two geologic periods in the Cenozoic era of geologic time.

THREATENED SPECIES: Any plant or animal species likely to become endangered within the foreseeable future throughout all or a part of its range and designated by the U.S. Fish and Wildlife Service under the Endangered Species Act. Also see ENDANGERED SPECIES.

TRAILHEAD: The terminus of a hiking, horse, or bicycle trail, accessible by motor vehicle and sometimes having parking, signs, a visitor register, and camping and sanitary facilities.

TRANSITIONAL PATHWAYS: The processes that cause a shift from one vegetation state to another.

TRAVERTINE: A mineral consisting of calcium carbonate deposited by spring waters.

TREAD LIGHTLY: A not-for-profit organization whose mission is to increase awareness of ways to enjoy the great outdoors while minimizing human impacts.

TUCSON ACTIVE MANAGEMENT AREA (AMA): One of five such active management areas in Arizona established under the 1980 Groundwater Management Code. Covering 3,866 mi^2 in southeast Arizona, this AMA includes portions of Pima, Pinal, and Santa Cruz counties and five incorporated cities and towns: Tucson, South Tucson, Oro Valley, Marana, and Sahuarita. Also within the AMA are the Pasqua Yaqui tribal lands and part of the Schuk Toak District and the entire San Xavier District of the Tohono O'odham Nation. The Tucson AMA has a statutory goal of by the year 2025 achieving safe yield (groundwater pumped from the aquifer not exceeding aquifer recharge). Also see ACTIVE MANAGEMENT AREA.

TURBIDITY: Cloudiness of water, measured by how deeply light can penetrate it from the surface. Highly turbid water is often called "muddy" although all kinds of suspended particles contribute to turbidity.

UNAUTHORIZED USE: Any use of the public lands not authorized or permitted.

UNDERSTORY: Plants growing under the canopy of other plants. Understory usually refers

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to grasses, forbs, and low shrubs under a tree or brush canopy. Also see OVERSTORY.

UNGULATES: Hoofed animals, including ruminants but also horses, tapirs, elephants, rhinoceroses, and swine.

UNIQUE FARMLAND: As defined by the Farmland Protection Policy Act of 1981, land other than prime farmland that is used for producing specific high-value food and fiber crops, as determined by the Secretary of Agriculture. Unique farmland has the special combination of soil quality, location, growing season, and moisture supply needed to economically produce sustained high quality or high yields of specific crops when treated and managed according to acceptable farming methods. Examples of such crops include citrus, tree nuts, olives, cranberries, fruits, and vegetables.

UNIQUE WATER: A water body determined by the Arizona Department of Environmental Quality as an outstanding water resource of the state because of exceptional recreational or ecological significance, such as important geology, flora, fauna, water quality, aesthetic values, or wilderness characteristics.

UPLANDS: Lands at higher elevations than the alluvial plain or low stream terrace; all lands outside the riparian-wetland and aquatic zones.

URBAN INTERFACE (WILDLAND-URBAN INTERFACE): The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. This interface creates conflicts and complicates fighting wildfires and conducting prescribed burns.

UTILIZATION (FORAGE): The proportion of the current year's forage consumed or destroyed by grazing animals. Utilization is usually expressed as a percentage.

VALID EXISTING RIGHTS: Locatable mineral development rights that existed when the Federal Land Policy and Management Act (FLPMA) was enacted on October 21, 1976. Some areas are segregated from entry and location under the Mining Law to protect certain values or allow certain uses. Mining claims that existed as of the effective date of the segregation may still be valid if they can meet the test of discovery of a valuable mineral required under the Mining Law. Determining the validity of mining claims located on segregated lands requires BLM to conduct a valid existing rights determination.

VANDALISM (CULTURAL RESOURCE): The unauthorized collecting, excavating, or defacing of cultural resources.

VARIABLE STOCKING: The practice of varying the stocking rate through the plant growing season with the objective of using forage at a rate similar to its growth rate. The stocking rate can be varied either by varying the number of animals in a set area or varying the acreage offered to a set number of animals. Also see STOCKING RATE and FIXED STOCKING RATE.

VASCULAR PLANT: A plant in the phylum Tracheophyta, which includes spermatophytes (seed plants) and pteridophytes (ferns and related plants).

VEGETATION STATES: The different plant communities produced by an ecological site.

VEGETATION STRUCTURE: The composition of an area's vegetation–plant species, growth forms, abundance, vegetation types, and spatial arrangement.

VEGETATION TREATMENTS: Treatments that improve vegetation condition or production.

Such treatments may include seedings; prescribed burning; or chemical, mechanical, and biological plant control.

VEGETATIONTYPE: A plant community with distinguishable characteristics.

VIABILITY: The capability of living, developing, growing, or germinating under favorable conditions.

VIEWSHED: The entire area visible from a viewpoint.

VISITOR DAY: 12 visitor hours, which may be aggregated continuously, intermittently, or simultaneously by one or more people.

VISUAL ASPECT: The visual first impression of vegetation at a particular time or seen from a specific point.

VISUAL RESOURCE MANAGEMENT (VRM): The planning, design, and implementing of management objectives to provide acceptable levels of visual impacts for all BLM resource management activities.

VISUAL RESOURCE MANAGEMENT (VRM) CLASSES: Classes with specific objectives for maintaining or enhancing scenic quality, including the kinds landscape modifications that are acceptable to meet the objectives.

Class I (preservation) provides for natural, ecological changes only. This class includes wilderness areas, some natural areas, some wild and scenic rivers, and other similar sites where landscape modification should be restricted.

Class II (retention of the landscape character) includes areas where changes in any of the basic elements (form, line, color, or texture) caused by management activities should not be evident in the characteristic landscape.

Class III (partial retention of the landscape character) includes areas where changes in the basic elements caused by management activities may be evident in the characteristic landscape. But the changes should remain subordinate to the existing landscape character.

Class IV (modification of the landscape character) includes areas where changes may subordinate the original composition and character. But the changes should reflect what could be a natural occurrence in the characteristic landscape.

WARM-SEASON PLANTS: Plants whose major growth occurs during the spring, summer, or fall and that are usually dormant in winter. Also see COOL-SEASON PLANTS.

WATER BAR: A low ridge of dirt, rock, or other material placed across a trail or dirt road on a hill to divert flowing water and protect the trail or road from erosion.

WATERSHED (CATCHMENT): A topographically delineated area that is drained by a stream system, that is, the total land area above some point on a stream or river that drains water past that point. The watershed is a hydrologic unit often used as a physical-biological unit and a socioeconomic-political unit for planning and managing natural resources. Because this plan does not cover the entire watershed for Cienega Creek, the term is used for that portion under BLM management.

WATERSHED CONDITION (WATERSHED HEALTH): The comparison of watershed processes to normal or expected measurements of properties such as soil cover, erosion rate, runoff rate, and groundwater table elevation; an assessment or categorization of an area by erosion conditions, erosion hazards, and the soil moisture/temperature regime.

WATERSHED FUNCTION: The combination of processes attributed to watersheds as part of the hydrologic cycle, including interception of rain by plants, rocks, and litter; surface storage by the soil; groundwater storage; stream channel storage; soil evaporation; plant transpiration; and runoff. These processes affect the following properties of the watershed: runoff rate, water infiltration rate, soil building rate, soil erosion rate, groundwater recharge rate, groundwater discharge rate, water table elevation, and surface water discharge. These properties in turn affect plant communities through soil attributes, including soil parent material, soil moisture, and nutrients; stream and rivers through flooding duration and magnitude, as well as sediment load, which structures the dimension, pattern, and profile of channels; and lakes and reservoirs through sedimentation and nutrient input.

WEED: Any plant that interferes with management objectives. A weed may be native or non-native, invasive or passive, or non-noxious.

WEED MANAGEMENT AREAS (WMAs): Partnerships of public land managers and private land owners formed to support and coordinate the attacking of noxious weeds in a watershed or general infestation area.

WETLAND: An area that is inundated or saturated by surface or ground water often and long enough to support and that under normal circumstances supports a prevalence of vegetation typically adapted for life in saturated soil. Wetlands include marshes, shallows, swamps, lake shores, bogs, muskegs, wet meadows, estuaries, cienegas, and riparian areas.

WILDCAT ROAD: A nonpermitted road on federally managed land.

WILDFIRE: Any wildland fire that is not meeting management objectives and therefore requires a suppression response.

WILDLIFE: A broad term that includes birds, reptiles, amphibians, and nondomesticated mammals.

WING FENCE: Fencing extending out from a corral and serving to help funnel livestock into the corral.

WITHDRAWAL: See MINERAL WITHDRAWAL.

WULFENITE (YELLOW LEAD ORE): A mineral, $PbMoO_4$, sometimes with calcium, chromium, or vanadium. An ore of molybdenum.

XERO-RIPARIAN: A streamside area that supports plant species more characteristic of uplands than wetlands but that is more densely vegetated than areas removed from the stream course. Flows in these channels are characteristically ephemeral.

REFERENCES

Acker, C.P. 1998. Senior Geologist, Georgia Marble Company, Talking Rock, GA, personal communication.

ADEQ. See Arizona Department of Environmental Quality.

ADES. See Arizona Department of Economic Security.

AGFD. See Arizona Game and Fish Department.

Amoco Production Company. 1980. Unpublished file data. Phoenix: Arizona Geological Survey.

Andrew, M.H. 1988. Grazing Impacts in Relation to Livestock Watering Points. *Trends in Ecology and Evolution* 3:336-339.

Arizona Department of Commerce. Various dates. *Community Profiles*. Phoenix.

Arizona Department of Economic Security. 1997. *Unemployment Reports for January through March 1997 (Prefinal) for Arizona Local Area Statistics*. Phoenix: Arizona Department of Economic Security, Research Administration.

_____. 1998. Population Projections-Arizona and Counties. Phoenix.

Arizona Department of Environmental Quality. 1998. Arizona Water Quality Assessment: 1998 - 305b Report and Arizona Provisional Water Quality Limited Waters List. Phoenix.

Arizona Department of Environmental Quality. 1999. Letter dated March 31 addressing the nomination of Cienega Creek as a unique water during the triennial review. Phoenix.

Arizona Game and Fish Department. 1981. Pronghorn Antelope Reintroduction Program. Fed. Aid Project W-53-R-32. Phoenix.

_____. 1993. Bats of Arizona. *Arizona Wildlife Views* (August). Phoenix.

_____. 1996. Wildlife of Special Concern in Arizona (public review draft). Phoenix.

Armour, C.L., D.A. Duff, and W. Elmore. 1991. The Effects of Livestock Grazing on Riparian and Stream Ecosystems. *Fisheries* 16(1):6-11.

Bahre, Conrad. J. 1995. Human Impacts on the Grasslands of Southeastern Arizona. In *The Desert Grassland*, edited by M.P. McClaran and T.R. Van Devender, pp. 230-264. Tucson: University of Arizona Press.

Ballinger, R.E. and J.D. Congdon. 1996. Status of the Bunch Grass Lizard, *Sceloporus scalaris*, in the Chiricahua Mountains of Southeastern Arizona. *Bulletin of the Maryland Herpetological. Society* 32:67-69.

Barbour, Roger W. and Wayne H. Davis. 1969. *Bats of America.* Lexington: University Press of Kentucky.

Basso, Keith H. 1971. *Western Apache Raiding and Warfare: From the Notes of Grenville Goodwin.* Tucson: University of Arizona Press.

BLM. See U.S. Department of the Interior, Bureau of Land Management.

Bock, C.E. and J.H. Bock. 1993. Proposal for a System of Federal Livestock Exclosures on Public Rangelands in the Western United States. *Conservation Biology* 7(3):731-733.

Bock, C.E., H.M. Smith, and J.H. Bock. 1990. The Effect of Livestock Grazing upon Abundance of the Lizard, *Sceloporus Scalaris*, in Southeastern Arizona. *Arizona Journal of Herpetology* 24(4):445-446.

Bolton, Herbert E. 1948. *Kino's Historical Memoir of Pimeria Alta.* Berkeley and Los Angeles: University of California Press.

Bota, Liciniu. 1996. Modeling of Ground-water Flow and Surface/Ground-water Interaction for Upper Cienega Creek Basin. M.S. thesis. Tucson: University of Arizona.

Brittell, J. D. and D.J. Pierce. 1984. *Washington Cougar Status Report.* Washington Department of Game. Olympia.

Bronitsky, Gordon and James D. Merritt. 1986. *The Archaeology of Southeast Arizona: A Class I Cultural Resource Inventory.* BLM Cultural Resource Series No. 2. Phoenix: U.S. Department of the Interior, Bureau of Land Management, Arizona State Office. NTIS Accession No. PB87 220224/AS.

Brooks, Kenneth N., Peter F. Ffolliott, Hans M. Gregersen, and John L. Thames. 1991. *Hydrology and the Management of Watersheds.* Ames: Iowa State University Press.

Brown, David E. (editor). 1982. Biotic Communities of the American Southwest—United States and Mexico. *Desert Plants* 4(1-4).

Brown, Richard L. 1982. Effects of Livestock Grazing on Mearn's Quail in Southeastern Arizona. *Journal of Range Management* 35(6):727-7232.

570

Brown, M. 1984. Habitat Selection by Coues White-tailed Deer in Relation to Grazing Intensity. In *Deer in the Southwest: A Workshop Held at New Mexico State University, Las Cruces, April 16-17, 1984*, edited by Paul R. Krausman and Norman S. Smith, pp. 1-6. Tucson: Arizona Cooperative Wildlife Research Unit and School of Renewable Natural Resources, University of Arizona.

Bureau of the Census. See U.S. Department of Commerce, Bureau of the Census.

Cagney, James A. 1993. Greenline Riparian-Wetland Monitoring. TR 1727-8 1993. Denver: U.S. Department of the Interior, Bureau of Land Management, Service Center.

Clarkson, R.W. and J.L. Rorabaugh. 1989. Status of Leopard Frog (*Rana pipiens* complex: Ranidae) in Arizona and Southeastern California. *Southwestern Naturalist* 34(4):531-538.

Clemmer, Pam. 1994. *The Use of Aerial Photography to Manage Riparian-Wetland Areas*. Technical Reference 1737-10 1994. Denver: U.S. Department of the Interior, Bureau of Land Management, Service Center.

Collins, William S. 1996. Cattle Ranching In Arizona. A Component of the Arizona Historic Preservation Plan. Phoenix: Arizona State Historic Preservation Office.

Connolly, G.E. 1991. *Assessing Populations*. In *Mule and Black-tailed Deer of North America*, edited by Olof C. Wallmo, pp. 287-345. Lincoln: University of Nebraska Press.

Cordery, Ted. 2000. Endangered species coordinator, Bureau of Land Management, Arizona State Office, Phoenix, personal communication.

Corman, T.E. 1992. *Evaluation of Ten Potential Northern Aplomado Falcon Reintroduction Areas in Southeastern Arizona*. Nongame and Endangered Wildlife Program Technical Report 26. Phoenix: Arizona Game and Fish Department.

Corman, T.E. and R.T. Magill. 2000. *Western Yellow-billed Cuckoo in Arizona: 1998 and 1999 Survey Report*. Nongame and Endangered Wildlife Program Technical Report 150. Phoenix: Arizona Game and Fish Department.

Cornwall, Caitlin X. 1998. Stream Stabilizing Traits in Common Graminoids from a Semi-arid Alluvial Stream. M.S. thesis. Tempe: Arizona State University.

Cox, L.J. 1994. Geology of the Gold Placers in the Greaterville District, Arizona. In *USGS Research on Mineral Resources, Part B - Guidebook for Field Trips*, McKelvey Forum 1994. U.S. Geological Survey Circular 1103-B. Washington: Government Printing Office.

Cuplin, Paul. 1987. *A Selected, Annotated Bibliography of Riparian Area Management*. Technical Reference 1737-1 1987. Denver: U.S. Department of the Interior, Bureau of Land Management, Service Center.

Dadkhah, N., and G.F. Gifford. 1980. Influences of Vegetation, Rock Cover, and Trampling on Infiltration Rates and Sediment Production. *Water Resources Bulletin* 16:979-986.

Davis, Goode P. Jr. 1982. *Man and Wildlife in Arizona: The American Exploration Period, 1824-1865.* Edited by Neil B. Carmony and David E. Brown. Phoenix: Arizona Game and Fish Department and Tucson: Arizona Cooperative Wildlife Research Unit.

Davis, O.K. 1994. Pollen Analysis of Borderland Cienegas. Report of the Arizona Nature Conservancy. Contract No. HQ/AZ-920815-1. KOSE grant K91WR08. Tucson, AZ: The Arizona Nature Conservancy.

De Vos, J.C., C. Richard Miller, W.D. Ough. 1984. Habitat Utilization by Mule Deer in a Semi-urban Area. In *Deer in the Southwest: A Symposium*, edited by P Krausman and N. S. Smith, pp. 128-131. Tucson: University of Arizona.

Di Peso, Charles C. 1953. *The Sobaipuri Indians of the Upper San Pedro River Valley, Southeastern Arizona.* Amerind Foundation Publication No. 6. Dragoon, AZ: Amerind Foundation.

Dowell, Gregory P. 1978. History of the Empire Ranch. MA thesis. Tucson: University of Arizona.

Dunne, Thomas and Luna B. Leopold. 1995. *Water in Environmental Planning* (13th printing). New York: W.H. Freeman Company.

Eddy, Frank W. and Maurice E. Cooley. 1983. *Cultural and Environmental History of Cienega Valley, Southeastern Arizona.* Anthropological Papers of the University of Arizona, No. 43. Tucson: University of Arizona Press.

Fernald, Anne Smith. 1987. Plant Community Ecology of Two Desert Marshes in Southeastern Arizona, Babocamari Cienega and Canelo Hills Cienega. MA thesis. Boulder: University of Colorado.

Fleischner, T.L. 1994. Ecological Cost of Livestock Grazing in Western North America. *Conservation Biology* 8(3):629-644.

Fontana, Bernard L. 1965. *An Englishman's Arizona, The Ranching Letters of Herbert R. Hislop 1876-1878.* Tucson: Overland Press.

Fontana, Bernard L. and J. Cameron Greenleaf. 1962. Johnny Ward's Ranch. *The Kiva* 28(1-2).

Forest Service. See U.S. Department of Agriculture, Forest Service.

FWS. See U.S. Department of the Interior, Fish and Wildlife Service.

572

Gebhardt, Karl, Steve Leonard, George Staidl, and Don Prichard. 1990. *Riparian and Wetland Classification Review*. Technical Reference 1737-5 1990. Denver: U.S. Department of the Interior, Bureau of Land Management, Service Center.

Gifford, G.F. and R.H. Hawkins. 1978. Hydrologic Impacts of Grazing on Infiltration: A Critical Review. *Water Resources Research* 14(2):305-313.

Gill, R.D. 1979. Activity Map of the Little Boquillas Ranch and Adjacent Areas, Cochise County, Arizona. Unpublished map, scale 1:62,500 in BLM Tucson Field Office files. Tenneco Oil Exploration and Production Minerals Exploration.

Girmendonk, Adele L. 1994. *Ocelot, Jaguar, and Jaguarundi Sighting Reports: Arizona and Sonora, Mexico*. Phoenix: Arizona Game and Fish Department.

Glinski, R.L., B.G. Pendleton, M.B. Moss, M.N. LeFranc, Jr., B.A. Milsap, and S.W. Hoffman (editors). 1988. *Proceedings of the Southeast Raptor Management Symposium and Workshop*. Symposium held May 21-24, 1986, at the University of Arizona. National Wildlife Federation Scientific and Technical Series No. 11. Washington, D.C.: National Wildlife Federation.

Griffith, J.S. and T.R. Tiersch. 1989. Ecology of Fishes in Redfield Canyon, Arizona, with Emphasis on *Gila Robusta Intermedia*. *Southwestern Naturalist* 34:131-134.

Hendrickson, D.A. and J.E. Brooks. 1991. Transplanting Short-lived Fishes in North American Deserts. In *Battle Against Extinction: Native Fish Management in the American West*, edited by W.L. Minckley and James E. Deacon, pp. 283-298. Tucson: University of Arizona Press.

Hendrickson, D.A. and W.L Minckley. 1984. Cienegas: Vanishing Climax Communities of the American Southwest. *Desert Plants* 6(3):131-176

Hoffmeister, Donald F. 1986. *Mammals of Arizona*. Tucson: University of Arizona Press.

Holechek, Jerry. L., Rex. D. Pieper, and Carlton H. Herbel. 1998. Considerations Concerning Stocking Rates (pp.190-227). In *Range Management*, 3rd edition. Englewood Cliffs, NJ: Prentice Hall.

Holechek, Jerry L., M. Thomas, F. Molinar, and D. Galt. 1999. Stocking Desert Grasslands: What We've Learned. *Rangelands* 21(6):8-12.

Huckell, Bruce. 1990. Late Preceramic Farmer-Foragers in Southeastern Arizona: A Cultural and Ecological Consideration of the Spread of Agriculture into the Arid Southwestern United States. Ph.D. dissertation. Tucson: Office of Arid Lands Studies, University of Arizona.

_____.1995. *Of Marshes and Maize: Preceramic Agricultural Settlements in the Cienega Valley, Southeastern Arizona*. Anthropological Papers of the University of Arizona, No. 59. Tucson: University of Arizona Press.

Humphrey, Robert R. 1958. The Desert Grassland, a History of Vegetational Change and an Analysis of Causes. *Botanical Review* 24(4):193-252.

Huth, J.H. 1996. Hydrogeochemical Modeling of Western Mountain Front Recharge, Upper Cienega Creek Sub-basin, Pima County, Arizona. Masters thesis. Tucson: University of Arizona.

Keith, S.B. 1974. *Index of Mining Properties in Pima County, Arizona*. Tucson: Arizona Bureau of Geology and Mineral Technology, University of Arizona.

Knight, E.L. 1996. A Water Budget and Land Management Recommendations for Upper Cienega Creek Basin. Unpublished thesis. Tucson: University of Arizona.

Krueper, David. 2000. Senior avian technical specialist, BLM Tucson Field Office, personal communication.

Latta, Margie J., C.J. Beardmore, and T.E. Corman. 1999. *Arizona Partners in Flight Bird Conservation Plan*. Version 1.0. Nongame and Endangered Wildlife Program Technical Report 142. Phoenix: Arizona Game and Fish Department.

Leonard, Steve, George Staidl, Jim Fogg, Karl Gebhardt, Warren Hagenbuck, and Don Prichart. 1992. *Procedures for Ecological Site Inventory with Special Reference to Riparian-Wetland Sites.* Technical Reference 1737-7 1992. Denver: U.S. Department of the Interior, Bureau of Land Management, Service Center.

Leonard, Steve, Gene Kinch, Van Elsbernd, Mike Borman, and Sherman Swanson. 1997. *Grazing Management for Riparian-Wetland Areas.* Technical Reference 1737-14 1997. Denver: U.S. Department of the Interior, Bureau of Land Management, National Applied Resources Sciences Center.

Leopold, Luna B. 1994. *A View of the River*. Cambridge, MA: Harvard University Press.

_____. 1997. *Water, Rivers, and Creeks.* Sausalito, CA: University Science Books.

Martin, S.C. 1978. Responses of Semidesert Grasses to Seasonal Rest. *Journal of Range Management* 26:165-170.

McCormick, Dale P. 1975. Effect of Mesquite Control on Small Game Populations. M.S. thesis. Tucson: University of Arizona.

Medina, A.L, D.G. Neary and J.E. Steed. 1995. Geomorphical Response of a Montane Riparian Habitat to Interactions of Elk, Cattle, Vegetation, and Hydrology. Poster presented at the joint annual meeting of the Arizona-New Mexico chapters of the Wildlife Society and the American Fisheries Society, February 9-11, Gallop, Mew Mexico.

Meffe, G.K. 1984 Effects of Abiotic Disturbance on Coexistance of Predator-prey Fish Species. *Ecology* 65(5):1525-1534.

Meehan, William R. (editor). 1991. *Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats.* American Fisheries Society Special Publication 19. Bethesda, MD: American Fisheries Society.

Minckley, W.L. 1973. *Fishes of Arizona.* Phoenix: Arizona Game and Fish Department.

Minckley, W.L. and James E. Deacon. 1991. *Battle Against Extinction: Native Fish Management in the American West.* Tucson: University of Arizona Press.

Minckley, W.L. and G.K. Meffe. 1987. Differential Selection by Flooding in Stream Fish Communities of the Arid American Southwest. In *Community and Evolutionary Ecology of North American Stream Fishes*, edited by W.J. Mathews and D.C. Heins, pp. 93-104. Norman: University of Oklahoma Press.

Muth, R.M.. and J.F. Bowe, Jr. 1998. Illegal Harvest of Renewable Natural Resources in North America: Toward a Typology of the Motivations for Poaching. *Society and Natural Resources* 11(1):9-24.

Myers, Lewis H. 1989. *Inventory and Monitoring of Riparian Areas.* Technical Reference 1737-3 1989. Denver: U.S. Department of the Interior, Bureau of Land Management, Service Center.

Naeser, R. and A. St. John. 1996. Water Use and the Future of the Sonoita Valley. Report prepared by the Yale School of Forestry and Environmental Studies. Elgin, AZ: Appleton-Whittell Research Ranch of the National Audubon Society.

National Research Council. 1994. *Rangeland Health: New Methods to Classify, Inventory, and Monitor Rangelands* Washington, D.C.: National Academy Press.

Neidinger, Paul S. and Barbara Zook. 1995. Heart of the Empire: Empire Ranch Historic Structure Report, Volume II. Unpublished manuscript prepared by the National Park Service. Tucson: U.S. Department of the Interior, Bureau of Land Management, Tucson Field Office.

Nelson, R.L, M.L. Mc Henry, and W.S. Platts. 1991. Road Construction and Maintenance. In *Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats*, edited by William R. Meehan, pp. 389-424. American Fisheries Society Special Publication 19. Bethesda, MD: American Fisheries Society.

NRCS. See U.S. Department of Agriculture, Natural Resources Conservation Service.

Nuzman, P.E. 1970. Empire-Sonoita Planning Area, Pima and Santa Cruz Counties, Arizona. Prepared for GAC Utilities, Inc. of Arizona. Kansas City, MO: Lane-Western Company, Inc.

575

Ockenfels, Richard A., D.G. Brooks, and C.H. Lewis. 1991. *General Ecology of Coues White-tailed Deer in the Santa Rita Mountains*. AGFD Technical Report. No. 6. Phoenix: Arizona Game and Fish Department.

Ockenfels, Richard A., A. Alexander, C.L. Dorothy Ticer, and W.K. Carrel. 1994. *Home Ranges, Movement Patterns, and Habitat Selection of Pronghorn in Central Arizona*. AGFD Technical Report 13. Phoenix: Arizona Game and Fish Department.

Officer, James E. 1987. *Hispanic Arizona, 1536-1856.* Tucson: University of Arizona Press.

Phillips, Allan, Joe Marshall, and Gale Monson. 1964. *The Birds of Arizona.* Tucson: University of Arizona Press.

Pickrell, Charles U. 1961. Transcript of an Interview with Mr. Harry Heffner, Manager of the Empire Ranch. Unpublished manuscript. Tucson: University of Arizona.

Pima County, Arizona. 2000. Priority Vulnerable Species: Data Compilation and Synthesis-June 2000. Sonoran Desert Conservation Plan. Tucson: Pima County, Arizona.

Pinkava, Donald J. 1999. Species Profile: Mesquite. *Arizona Riparian Council* 12:9-10.

Platts, William S. 1991. Livestock Grazing. In *Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats*, edited by William R. Meehan, pp. 389-423. American Fisheries Society Special Publication 19. Bethesda, MD: American Fisheries Society.

Poole, D.R. 1999. *Hydrogeologic Investigations of the Sierra Vista Subwatershed of the Upper San Pedro Basin, Cochise County, Southeastern Arizona*. Water Resources Investigation Report 99-4197. Tucson, AZ: U.S. Department of the Interior, Geological Survey.

Pursley, D. 1977. Illegal Big Game Harvest During Closed Season. *Proceedings of the Annual Conference Western Association of State Game Fish Commissioners* 57:67-71.

Reid, J. Jefferson and David E. Doyle. 1986. *Emil W. Haury's Prehistory of the American Southwest.* Tucson: University of Arizona Press.

Reid, J. Jefferson and Stephanie Whittlesey. 1997. *The Archaeology of Ancient Arizona*. Tucson: University of Arizona Press, Arizona.

Richardson, M.L., S.D. Clemmons, and J.C. Walker. 1979. *Soil Survey of Santa Cruz and Parts of Cochise and Pima Counties, Arizona.* Washington, D.C.: U.S. Department of Agriculture, Soil Conservation Service and Forest Service, in cooperation with Arizona Agricultural Experiment Station.

Robinson, S.K., S.I. Rothstein, M.C. Brittingham, L.J. Petit, and J.A. Grzybowski. 1995. Ecology and Behavior of Cowbirds and Their Impact on Host Populations. In *Ecology and Management of Neotropical Migratory Birds. A Synthesis and Review of Critical Issues*, edited by T.E. Martin and D.M. Finch, pp. 428-460. New York: Oxford University Press.

Rosen, Phillip. 1996. Curator of Herpetology, University of Arizona, Tucson, personal communication after collection trip to Cienega Creek.

Rosgen, David L. 1996. *Applied River Morphology*. Pagosa Springs, CO: Wildland Hydrology.

Roudebush, E.R. 1996. The Influence of Bedrock on Perennial Stream Flow in the Upper Cienega Creek Basin, Pima County, Arizona. Masters thesis. Tucson: University of Arizona.

Sacco, Joe. 1999. Unit 35B Wildlife Manager, Arizona Game and Fish Department, personal communication.

Schoenherr, Allan A. 1974. Life History of the Topminnow *Poeciliopsis occidentalis* in Arizona and an Analysis of its Interaction with the Mosquitofish, *Gambusia affinis*. Ph.D. dissertation. Tempe: Arizona State University.

_____. 1988. A Review of the Life History and Status of the Desert Pupfish. *Bulletin of the Southern California Academy of Science* 87:104-134.

SCS: See U.S. Department of Agriculture, Soil Conservation Service.

Sellers, W.D. and R.H. Hill (editors). 1974. *Arizona Climate: 1931-1972*. Tucson: University of Arizona Press.

Seymour, Deni J. 1989. The Dynamics of Sobaipuri Settlement in the Eastern Pimeria Alta. *Journal of the Southwest* 31(2):205-222.

Sheridan, Thomas E. 1995 *Arizona: A History*. Tucson: University of Arizona Press.

Simms, Jeffrey R. 2000. Cienega Creek Stream Restoration. In *Creative Cooperation in Resource Management, Third Conference on Research and Resource Management in the Southwestern Deserts, May 16-18, 2000*, edited by W.L. Halvorson and B.S. Gebow. Tucson: U.S. Department of the Interior, Geologic Survey, Western Ecological Research Center, Sonoran Desert Field Station, University of Arizona.

Simms, Jeffrey R. and Karen M. Simms. 1992. What Constitutes High Quality Habitat for Gila Topminnow (*Poeciliopsis occidentalis occidentalis*)? An Overview of Habitat Parameters Supporting a Robust Population at Cienega Creek, Pima Co., AZ. Abstract. *Proceedings of the Desert Fishes Council* 22-23:82.

Simms, Karen M., and V. Dalton. 1998. Survey of Lesser Long-nosed Bat Foraging Territory and Roosts in the Greater Cienega Creek Basin, Pima County, Arizona. Preliminary Report. Tucson, AZ: U.S. Department of the Interior, Bureau of Land Management, Tucson Field Office.

Simons. Lee H. 1987. Status of the Gila Topminnow (*Poeciliopsis occidentalis occidentalis*). Report to the U.S. Fish and Wildlife Service, Albuquerque, New Mexico. Phoenix: Arizona Game and Fish Department.

Smith, Bruce and Don Prichard. 1992. *Management Techniques in Riparian Areas*. Technical Reference 1737-6 1992. Denver: U.S. Department of the Interior, Bureau of Land Management, Service Center.

Smith, E.L., P.R. Ogden, and E.B. Fish. 1975. Use of Earth Resources Technology Satellite Data in a Natural Resource Inventory. Tucson: University of Arizona.

Smith, N.S. 1984. Reproduction in Coues White-tailed Deer in Relation to Drought and Cattle Stocking Rates. In *Deer in the Southwest: A Symposium*, edited by P. Krausman and N. Smith, pp. 13-20. Tucson: University of Arizona, School of Renewable Natural Resources.

Sonoita Crossroads Community Forum. 2000. A Draft Comprehensive Plan for Northeastern Santa Cruz County. Sonoita, AZ: Sonoita Crossroads Community Forum.

Soulliére-Harrison, Laura and Paul J. Neidinger. 1995. Heart of the Empire, Historic Structure Report, Empire Ranch, Arizona. Santa Fe, NM: U.S. Department of the Interior, National Park Service, Southwest Regional Office, Division of History and Division of Conservation. Manuscript on file at BLM Tucson Field Office.

Spicer, Edward H. 1962. *Cycles of Conquest: The Impact of Spain, Mexico, and the United States on the Indians of the Southwest, 1533-1960.* Tucson: University of Arizona Press.

Sredl, M.J. (editor). 1997. *Ranid Frog Conservation and Management.* Nongame and Endangered Species Program Technical Report 121. Phoenix: Arizona Game and Fish Department.

Stebbins, R.C. 1966. *A Field Guide to Western Reptiles and Amphibians; Field Marks of All Species in Western North America.* Boston: Houghton Mifflin Co.

_____. 1985. *A Field Guide to Western Reptiles and Amphibians; Field Marks of All Species in Western North America.* 2nd edition. Boston: Houghton Mifflin Co.

Stein, Pat H. 1990. Homesteading in Arizona 1862-1940. A Component of the Arizona Historic Preservation Plan. Phoenix: Arizona State Historic Preservation Office.

Stewart, Janet Ann. 1970. The Empire Ranch: Its House and Its History. Report by the Arizona Pioneers' Historical Society. Tucson.

_____. 1974. *Arizona Ranch Houses, Southern Territorial Styles, 1867-1900.* Tucson: Arizona Historical Society.

Stipp, T.F. and R. Dockter. 1987. Lands Classified Known to Be Valuable and Prospectively Valuable for Oil and Gas. Unpublished map, scale 1:500,000. Phoenix: U.S. Department of the Interior, Bureau of Land Management, Arizona State Office.

Stone, Connie L. 1986. *Deceptive Desolation: Prehistory of the Sonoran Desert in West Central Arizona.* Cultural Resources Series No. 1. Phoenix: U.S. Department of the Interior, Bureau of Land Management, Arizona State Office. NTIS Accession No. PB87 220216/AS.

Swanston, Douglas N. 1991. Natural Processes. In *Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats*, edited by William R. Meehan, pp. 138-180. American Fisheries Society Special Publication 19. Bethesda, MD: American Fisheries Society.

Swanson, Earl H. 1951. An Archaeological Survey of the Empire Valley, Arizona. MA thesis. Tucson: University of Arizona.

Thurow, T.L. 1991. Hydrology and Erosion. In *Grazing Management*, edited by R.K. Heitstchmidt and J.W. Stuth, pp. 141-151. Portland, OR: Timber Press.

Turner, Dale Scott., Peter A. Holm, and Cecil R. Schwalbe 1999. *Herpetological Survey of the Whetstone Mountains.* Final Report to Arizona Game and Fish Department. Phoenix: Arizona Game and Fish Department.

U.S. Department of Agriculture, Forest Service. 1986. *Coronado National Forest Plan.* Tucson, AZ: USDA Forest Service, Southwestern Region.

U.S. Department of Agriculture, Soil Conservation Service. 1976. *National Range Handbook: Rangeland, Grazable Woodland, Native Pasture.* Revised Edition. Washington D.C.

_____. 1981. *Land Resource Regions and Major Land Resource Areas of the United States.* Agriculture Handbook 296. Washington, D.C.: Government Printing Office.

U.S. Department of Agriculture, Natural Resources Conservation Service. 1993. Draft Soil Survey of Planning Area County, Arizona, Eastern Part (unpublished). Tucson, AZ.

_____. 1994. *Empirita Ranch Coordinated Management Plan.* Tucson, AZ.

U.S. Department of Agriculture, Natural Resources Conservation Service, Grazing Lands Technology Institute. 1997. *National Range and Pasture Handbook.* Washington, D.C.

U.S. Department of Commerce, Bureau of the Census. 1993a. *Housing and Household Economic Statistics.* Washington, D.C.: Government Printing Office.

_____. 1993b. *Income, Poverty, and Valuation of Noncash Benefits.* Series P60-188. Washington, D.C.: Government Printing Office

_____. 1996. Census CD 1990. East Brunswick, NJ: GeoLytics, Inc.

U.S. Department of the Interior, Bureau of Land Management. 1986. *Eastern Arizona Grazing Final Environmental Impact Statement.* Phoenix and Safford, AZ: BLM Phoenix and Safford Districts.

_____. 1987a. *Phoenix Resource Management Plan and Environmental Impact Statement, Draft.* Phoenix, AZ: BLM Phoenix District.

_____. 1987b. *Rangeland Program Summary to the Eastern Arizona Grazing EIS.* Phoenix and Safford, AZ: BLM Phoenix and Safford Districts.

_____. 1987c. Management Situation Analysis for the Phoenix Resource Management Plan. Unpublished document in the Phoenix Field Office Planning Archives. Phoenix: BLM Phoenix District.

_____. 1987d. Riparian Area Condition Evaluation Handbook. Unpublished manuscript. Phoenix, AZ: BLM Phoenix District.

_____. 1988. *Phoenix Resource Management Plan and Environmental Impact Statement, Final.* Phoenix, AZ: BLM Phoenix District.

_____. 1990. Riparian Management and Channel Evolution (a self-study-guide). Course No. SS1737-2. Phoenix, AZ: BLM Phoenix Training Center.

_____. 1991. *Safford District Resource Management Plan and Environmental Impact Statement, Final.* Safford, AZ: BLM Safford District.

_____. 1993. *Safford Resource Management Plan Amendment.* Safford AZ: BLM Safford District.

_____. 1994a. *Rangeland Reform '94 Draft Environmental Impact Statement.* Washington, D.C.

_____. 1994b. *Land Tenure Amendment to the Safford District Resource Management Plan.* Safford, AZ: BLM Safford District.

_____. 1994c. *Arizona Statewide Wild and Scenic Rivers Draft Legislative Environmental Impact Statement.* Phoenix: BLM Arizona State Office.

_____. 1995. *Interim Grazing Plan for the Empire Ranch.* Tucson, AZ: BLM Tucson Field Office.

_____. 1999. *BLM Interpretive Strategy: Interpretation Is the Voice of the Resources.* Washington, D.C.: BLM Washington Office.

U.S. Department of the Interior, Bureau of Land Management, Proper Functioning Condition Work Group. 1993. *Process for Assessing Proper Functioning Condition.* Technical Reference 1737-9 1993. Denver, CO: BLM Service Center.

_____. 1994a. *Process for Assessing Proper Functioning Condition for Lentic Riparian-Wetland Areas.* Technical Reference 1737-11 1994. Denver, CO: BLM Service Center

U.S. Department of the Interior, Fish and Wildlife Service. 1988. Endangered and Threatened Wildlife and Plants: Determination of Endangered Status for Two Long-nosed Bats. 50CFR 17 *Federal Register* 53(190):38456-38460.

_____. 1990. *Northern Aplomado Falcon Recovery Plan.* Albuquerque, NM.

_____. 1992. *Handbook of Arizona's Endangered, Threatened, and Candidate Plants.* Phoenix, AZ.

_____. 1993a. *Desert Pupfish (*Cyprinodon Macularius*) Recovery Plan.* Albuquerque, NM.: U.S. Fish and Wildlife Service, Region 2.

_____.1993b. Endangered and Threatened Wildlife and Plants; Proposed Rule to List the Southern Willow Flycatcher and Endangered with Critical Habitat. 50 CFR 17 *Federal Register* 58(140):39495-39522.

_____. 1994. *Draft Gila Topminnow (*Poeciliopsis O. Occidentalis*) Revised Recovery Plan.* Albuquerque, NM.

_____.1996. Biological Opinion for the Cienega Creek Interim Grazing Plan. Biological Opinion No 2-21-95-F-177. Phoenix, AZ: FWS, Arizona Ecological Services Field Office.

_____. 1997a. Endangered and Threatened Wildlife and Plants; Final Rule to Extend Endangered Status to the Jaguar in the United States. 50 CFR 17 *Federal Register* 62(140):39147-39157.

_____. 1997b. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for Three Wetland Species Found in Southern Arizona and Northern Sonora, Mexico. 50 CFR 17 *Federal Register* 62(3):665-689.

_____. 2000. Endangered and Threatened Wildlife and Plants; Proposal to List the Chiricahua Leopard Frog as Threatened with a Special Rule. 50 CFR 17 *Federal Register* 65(115):37343-37357.

U.S. Interagency Ecosystem Management Task Force. 1995-1996. *The Ecosystem Approach: Healthy Ecosystems and Sustainable Economies.* Washington, D.C.: U.S. Department of the Interior. Distributed by National Technical Information Service, Springfield, VA.

Van Haveren, Bruce P. and William L. Jackson. 1986. Concepts in Stream Riparian Rehabilitation. In *Transactions of the Fifty-first North American Wildlife and Natural Resources Conference*, pp. 280-289. Washington, D.C.: The Wildlife Management Institute.

Van Pelt, William E. 1999. *The Black-tailed Prairie Dog Conservation Assessment and Strategy.* Nongame and Endangered Wildlife Program Technical Report 159. Phoenix: Arizona Game and Fish Department.

Wagoner, Jay J.1952. *History of the Cattle Industry in Southern Arizona, 1540-1940.* Social Science Bulletin No. 20. Tucson: University of Arizona.

Weedman, D.A. and K.L. Young. 1995. *Gila Topminnow Extirpation Sites in Arizona: 1994-95 Field Season Results.* Nongame and Endangered Species Program Technical Report 80. Phoenix: Arizona Game and Fish Department.

Whitford, W.G., G.S. Forbes, and G.I. Kerley. 1995. Diversity, Spatial Variability, and Functional Roles of Invertebrates in Desert Grassland Ecosystems. In *The Desert Grassland,* edited by M.P. McClaran and T.R. Van Devender, pp. 152-195. Tucson: University of Arizona Press.

Wilson, John P. 1995. *Islands in the Desert: A History of the Uplands of Southeastern Arizona.* Albuquerque: University of New Mexico Press.

Witcher, J.L., C. Stone, and W.R. Hahman, Sr. 1982. *Geothermal Resources of Arizona.* Map, scale 1:500,000. Tucson: Arizona Bureau of Geology and Mineral Technology, University of Arizona.

Zook, Barbara. 1994 Empire Ranch, Stabilization of the Ranch Hands House. Santa Fe, NM: U.S. Department of the Interior, National Park Service, Southwest Regional Office, Division of History and Division of Conservation. Manuscript on file at BLM Tucson Field Office.

ABBREVIATIONS

ACEC: area of critical environmental concern

ADEQ: Arizona Department of Environmental Quality

ADES: Arizona Department of Economic Security

AGFD: Arizona Game and Fish Department

AMA: active management area

AMP: allotment management plan

AUM: animal unit month

ASLD: Arizona State Land Department

BLM: Bureau of Land Management (U.S. Department of the Interior)

cfs: cubic feet per second

CYL: cattle year-long

MLRA: major land resource area

NCA: National Conservation Area

NRCS: Natural Resources Conservation Service (U.S. Department of Agriculture)

OHV: off-highway vehicle

PFC: proper functioning condition

PNC: potential natural community

RACE: Riparian Area Condition Evaluation

RMP: resource management plan

SRP: special recreation permit

T&E: threatened and endangered

VRM: visual resource management

WMA: weed management area

WSR: wild and scenic river

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